

The Mining Journal

RAILWAY AND COMMERCIAL GAZETTE

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1166—VOL. XXVII.]

London, Saturday, December 26, 1857.

STAMPED . . . SIXPENCE.
UNSTAMPED . . . FIVEPENCE.

M. R. JAMES CROFTS, MINING AND SHAREBROKER,
No. 1, FINCH LANE, LONDON (established 14 years), TRANSACTS every kind of BUSINESS in MINING SHARES, but, not being a DEALER, BUYS and SELLS only on orders confined to him.

The important reduction in the value of money implies a termination to the late crisis, so far as it has been caused or continued by its late unprecedented dearth, and must have an immediate beneficial effect upon all markets, but of the mining market (as a speculative one) in particular. Mr. Crofts can now confidently anticipate large profits to purchasers who come into the market without delay, and thus avail of the present depressed rates, and especially in mines whose value have been tested by the severe and long-continued pressure,—namely, amongst many others,—

Wheal Edward. West of Towy.
Valley of Towy.
Sortridge Consols. St. Day United.
Pendene. Providence.
Catherine and Jane. Margaret.
Wheal Bassett.

Mr. Crofts is ready to furnish a list of CHEAP SHARES, or such as have receded in value 50 to 75 per cent., and yet have vitality in them to pay profits hereafter.

* * * Special business in VIRTUOUS LADY MINE, either in buying or selling.

M. R. JAMES LANE, No. 29, THREADNEEDLE STREET,
MINING SHARE DEALER.

JAMES B. BRENCHLEY,
DEALER IN MINING, RAILWAY SHARES, &c.
11, ROYAL EXCHANGE, LONDON.

PETER WATSON (13 years' experience), MINING BROKER,
STOCK and SHARE DEALER, will EXECUTE all ORDERS entrusted to his care with punctuality. Commission, 2½ per cent. on all transactions.
Bankers: Union Bank of London.

MINE SHARES FOR SALE.—
10 Alfred Consols; 4 Bell and Lanark, £4; 10 Margery; 10 Carnforth; 20 South Bog, £1; and upwards of £10,000 worth of valuable shares equally cheap. The present opportunity offers a fair chance for capitalists investing in this description of property.

4, CUSHION-COURT, OLD BROAD-STREET, E.C.

TO CAPITALISTS.—RELIABLE INFORMATION may be obtained on application to the undersigned, in respect of MISCELLANEOUS SECURITIES generally, BANKS, INSURANCE SHARES, LAND COMPANIES, MINES (British and Foreign), RAILWAYS, FOREIGN STOCKS, and the PUBLIC FUNDS BOUGHT AND SOLD at the closest market prices, and at moderate commission. References given and required. JOHN BATTERS, Stock and Sharebroker. 26, Throgmorton-street, London, E.C.

M. R. JOSIAS HUGO HITCHINS (Consulting Mining Engineer to the Devon Great Consols) informs his friends and capitalists generally that his PRESENT ARRANGEMENTS will enable him to AFFORD GREATER FACILITY AND ADVANTAGE OF CONSULTATION on the eligibility and value of MINING INVESTMENTS.

Mr. J. H. Hitchins will provide correct plans and sections for valuable reference; ensure inspections and ensure reports by the best informed, most experienced, and disinterested agents, and will always, when practicable, perform such responsible duties himself.

Mr. J. H. Hitchins will visit the mines of Devon and Cornwall, the North of England, Ireland, and Wales, to collect the most trustworthy information and opinions on their general working, state, prospects, and value.

Mr. J. H. Hitchins values his reputation as the projector, and having been for many years the chief superintendent of those wonderful mines, the Devon Great Consols, and others of great importance; and presumes that the valuable experience acquired and mastered by him during his well-known successful development of them will guarantee the best advice to capitalists in their investments, both in dividend mines, and those capable of the greatest and earliest success.

Mr. J. H. Hitchins will offer his best advice and assistance to the projectors of new undertakings of good promise and probable value, and to existing companies, in effecting the best improvements in the underground and surface departments, the machinery, means, appliances, and management generally, of their mines.

Mr. J. H. Hitchins has no hesitation in saying that mines, judiciously selected, and effectively worked with sound practical judgment and economy, prove very profitable investments.—Tavistock, Dec. 24, 1857.

M. R. F. E. BLYTH, MINING SHAREBROKER, No. 1, ST. MICHAEL'S ALLEY, CORNHILL, is commissioned to SELL SHARES in most of the DIVIDEND and PROGRESSIVE MINES. As Mr. Blyth confides himself strictly to commission business, the utmost reliance can be placed that all business entrusted to him will meet with prompt attention and regularity.

TO MINING COMPANIES.—CAPT. JOSEPH RICHARDS OFFERS HIMSELF AS MANAGER AND PURSER OF MINES.
Mines Dialed, and Plans and Sections furnished.

The Dialling and Mapping of Mines regularly attended to.

Mines inspected either in this country or abroad, on reasonable terms.

Waterval, Bridestow, Exeter, North Devon, Dec. 24, 1857.

M. R. W. H. BRUMBY, STOCK AND SHAREBROKER,
1, QUIET STREET, BATH, is in a position to give the BEST ADVICE in the SELECTION and PURCHASE of DIVIDEND and PROGRESSIVE MINES.

M. R. LINTHORNE, ENGLISH AND FOREIGN MINING AGENT, 3, ADAM'S COURT, OLD BROAD STREET, LONDON. BUSINESS TRANSACTED in all ENGLISH and FOREIGN MINES, and other SECURITIES, on the usual terms of commission. Information afforded in respect to Dividend-paying and Progressive Mines.

M. R. E. GOMPERS, MINING SHARE DEALER,
3, CROWN COURT, THREADNEEDLE STREET, LONDON.

JAMES H. COCK, MINE SHAREBROKER, GENERAL COMMISSION AGENT, AND ACCOUNTANT, REDRUTH, CORNWALL. Orders for the PURCHASE and SALE of MINE SHARES, MINING MATE-RIALS, &c., promptly attended to.

CAPT. THOMAS DUNN, of TAVISTOCK, undertakes to INSPECT, REPORT, and SURVEY any MINES or MINERAL PROPERTY in ENGLAND, IRELAND, SCOTLAND, or WALES. No objection to take the management of any mine or mines in the neighbourhood of Tavistock.

M. R. PALMER, NORTH DERBYSHIRE MINERAL RECORD OFFICE, MARKET HALL BUILDINGS, CHESTERFIELD, DEALER IN ALL DESCRIPTIONS OF MINING SHARES AND STOCKS. Several Derbyshire mines now offer great advantage to investors.

HENRY GOULD SHARE, BRITISH AND FOREIGN STOCK AND SHARE DEALER, 32, POULTRY, LONDON, E.C.

SHARES FOR SALE, at net prices:—

28 Peden-as-dress, 12s. 10 Bull and Bertha, 5s. 6d. 20 Bull, & Bass, Unit, 10s. 90 Molland, 1s. 4d., calls all calls paid. 10 South Bull and West Penstrith, 10s. 20 South Bog, 25s. 200 Chancellsorville, 2s. 4d.

Mr. GOULD SHARE will be happy to receive any buying or selling orders. Brokers, agents, dealers, and others, residing in the mining districts of Devon, Cornwall, and elsewhere, will find a ready market, on sending positive instructions to buy or sell.

Mr. GOULD SHARE offers his services to parties having spare capital to invest. He receives early information relative to all improvements in the mines, &c., consequently can give good advice as to the safest investments.

Bankers: London and Westminster Bank, Lombard, Tidby.

INVESTMENT.—Messrs. FULLER and CO., 51, THREADNEEDLE STREET, LONDON, continue to TRANSACT BUSINESS in BANKING, MINING, RAILWAY, and OTHER SECURITIES, many of which will safely pay from 15 to 25 per cent. Those of a progressive character frequently rising above 100 per cent.

Since calling public attention to several mines, a rise has taken place of the following:—Cradock Moor, from £35 to £45, equal to £10,550; Calstock Consols, 43½ to £54, or £12,288; East Russell, from 10s. to 12s.; £6,000; Wheal Edward, £4 to £9, being an increase of £20,450; Swanpool, £1 to £2, or £5,400: total increase of value in four months, £54,718.

The following shares present equally as good prospects of success, and worth immediate attention:—

Great Wheal Busy. Lady Bertha. Peter Tavy Consols.
Drake Walls. Lady Eliza. South Corn Brass.
Tokyber Consols. South Lady Bertha. West Wheal Edward.
WANTED.—Alfred Consols, Botallack, Dolcoath, Hington Down, North Rosker, South Cadron, Wheal Margery, Edward, Lode, Tredud, Tredy.

UNITED STATES OF AMERICA.—DUPEE, PERKINS, and SAYLES, BOSTON, MASSACHUSETTS, BROKERS for the PURCHASE and SALE of STATE, CITY, and RAILROAD SECURITIES, MANUFACTURING and BANK SHARES, give particular attention to the MINING COMPANIES OF LAKE SUPERIOR, and furnish reliable information concerning them.

(Dupee, Perkins, and Sayles refer to the Editor of the Mining Journal.)

GEOERGE MOORE, DEALER IN MINING SHARES,
1, CROWN COURT, THREADNEEDLE STREET.

GEORGE Moore will SELL the following SHARES, or any part, at quoted prices, FREE OF ANY COMMISSION:—

5 Alfred Consols, £13. 10 Great Vor, 37s. 6d. 25 Vale of Towy, 17s. 9d.
1 Gramb. and St. Aubyn, £82½. 2 North Rosker, £25. 5 Wheal Kitty (Lelant), £12½.
25 Sortridge Con., 36s. 6d. 25 Vale of Towy, 17s. 9d.
NON-DIVIDEND.
5 Cluj and Wentw., 25s. 5 G. W. Alfred, 24s. 6d. 20 Virtuous Lady, 30s.
20 East Alfred, 43s. 6d. 10 Great Wh. Busy, 25s. 6d. 10 Wh. Edward, 25s. 18s. 9d.
25 East Rosemary, £5. 20 Lady Bertha, 19s. 6d. 20 Wh. Grenville, 25s. 9d.
10 E. Wh. Russell, 61s. 6d. 15 North Down, 27s. 6d. 50 Wheal Zion, 6s.

In any business that George Moore is favoured with, in which he is the buyer, he will give CASH ON RECEIPT OF TRANSFER.

M. E. S. R. S. J. J. REYNOLDS AND SON, 1, ROYAL EXCHANGE BUILDINGS, LONDON, E.C., ENGLISH AND FOREIGN STOCK, RAILWAY, AND MINING SHAREBROKERS, beg to inform their friends and the public that the present time is a FAVOURABLE OPPORTUNITY for INVESTMENT in many undertakings of a substantial character, paying dividends worthy the attention of the capitalist.

Every information can be obtained at their offices, which their practical experience enables them to give, not only of mines and other properties of established value, but of those that are not.

M. E. S. R. S. POWELL AND COOKE, 8, HERCULES CHAMBERS, OLD BROAD STREET, LONDON.

Messrs. POWELL and COOKE are of opinion that the time has now arrived when investments may be safely made in good progressive mines, and consider the following shares will advance in price are long. The current prices are—

Vale of Towy, 16s. to 18s. Wheal Edward, 25s. to 27½.
East Wheal Russell, £30 to £35. St. Day United, 17s. 6d. to 21.
West Grenville, 5s. 6d. to 6s. Kelly Bray, 21s. to 21½.
Great Hewas, 16s. to 17s. 6d. Virtuous Lady and Wh. Bedf., 20s. to 25s.
West Par, 10s. to 12s. 6d.

JAMES HERRON has FOR SALE the following SHARES, at the prices quoted, and FREE OF COMMISSION:—

5 Bryntal, 8s. 9d. 480 Gwydyr, 6d., subject to payment of 1s. 6d. per share calls. 1 South Cadron, £317 14s.
10 Boiling Well, 28s. 9d. 10 St. Aub. & Grylls, 24s. 6d.
15 Balnoon Cons., 8s. 9d. 20 South Condurrow, 3s. 6d.
20 Cath. and Jane, 6s. 10d. 20 Tamar Cons., 18s. 9d.
1 Cefn Brynno, 24½s. 6d. 1 Trumper Cons., £22½.
20 Chancellsorville, 2s. 6d. 5 Tintoret, £3 3s.
20 Coll. Mines, 3s. 9d. 10 Trewhella, 17s. 6d.
10 Drake Walls, 29s. 9d. 10 Vale of Towy, 18s. 9d.
20 Dwyryd Castell, 5s. 6d. 5 Wheal Wrey, 25s.
5 East Buller, 25s. 6d. 15 Wheal Capid, 9s. 6d.
20 East Tamar. 20 North Downs, 25s. 1 Wheal Margaret.
20 East Providence. 20 Pem. & E. Crin., 10s. 9d. 1 Wh. Mary Ann, £461.
10 East Trefusis, 25s. 6d. 10 Peden-in-dreis, 15s. 9d. 1 Wh. Edward, 25s. 17s. 6d.
6 West Wh. Rose, 25s. 6d. 10 Pendene Con., 67s. 6d. 20 Wheal Bassett, £34½.
4 Forest. 1 Rosemary, 25s. 6d. 10 Wheal Hender, 18s. 9d.
20 Gawton Unit., 12s. 9d. 10 South Bog (Limited), 10s. 6d. 10 West Par, 9s.
5 Great Alfred, 24s. 9d. 5 Shropshire, 10s. 6d. 10 West Grenville, 5s. 6d.
5 Great Hewas, 17s. 6d. 5 St. John del Rey, £10.
50 Great Hewas, 17s. 6d. 5 West Sharp Ton, 25s.

As was anticipated, the Bank has reduced the rate of interest to 8 per cent., and the money market is daily becoming easier; this must have an influence in the Mining Market, and it is to presume the price of well-selected mines will soon be considerably higher. Those, therefore, who are disposed to invest should not delay making their purchases.

Mr. Haxton recommends with confidence the following—Trelawny, Mary Ann, Wheal Margaret, Vale of Towy, Drake Walls, South Cadron, West Cadron, West Bassett, Kelly Bray, Grambler and St. Aubyn, Strat Park, and St. Aubyn and Grylls, 2, Adam's-court, Old Broad-street, London, Dec. 24, 1857.

M. E. S. R. S. VIVIAN AND REYNOLDS, MINE AGENTS, 68, OLD BROAD STREET, LONDON, E.C.

Messrs. VIVIAN and REYNOLDS are enabled, through the long experience of Mr. W. C. VIVIAN as an underground agent and manager of mines in Cornwall, and in various foreign countries, to afford information on most important mining districts; and to inspect and report on mines. They are also enabled, by the several years' acquaintance of Mr. J. J. Reynolds, jun., with the transaction of the London share market, to obtain every advantage for those who may want either to buy or sell mining or any other description of stock.

Messrs. VIVIAN and REYNOLDS have daily information from the principal seats of mining, which is at the service of those who may honour them with their confidence.

The value of mining stock has been depreciated in value, in common with almost every other description of property, by the disordered state of the money market; those persons, therefore, who are in a position to purchase at present prices have more than ordinary chances in their favour of profiting by a rise in market value. It is generally supposed that the worst of the financial pressure has been passed, and the downward tendency in the prices of copper and tin has been arrested, so that there is every probability that the value of mining shares will soon again rally.

Messrs. VIVIAN and REYNOLDS are, therefore, of opinion that the present is a favourable opportunity for purchasing shares in mines that are conducted on sound business principles, and situated in good localities, and they recommend the following:

North Wheal Crofty. West Grenville.
North Rosker. North Frances. South Condurrow.
Camborne Vean. New Wheal Vor.

JOHN GLEDHILL AND CO., MINE AGENTS, SHARE BROKERS, AND GENERAL DEALERS.

MINING RECORDS OFFICE, 12, SOUTH PARADE, LEEDS.

Mines well selected are the best investments, paying from 15 to 30 per cent. on the outlay. They have to OFFER SHARES in most of the DIVIDEND and PROGRESSIVE MINES, and are ready to give every information relative to all mining matters.—Dated Dec. 24, 1857.

M. R. FRANCIS R. BILL, CONTRACTOR, AND GENERAL ACCOUNTANT AND AUDITOR, 32, BUCKLERSBURY, LONDON, E.C.

CONTRACTOR for the SUPPLY of RAILWAY MATERIALS of every description. Estimates prepared. Agencies undertaken. ACCOUNTANTSHIP BUSINESS of all kinds performed under contract, whereby a considerable saving on the usual cost may be effected.

M. R. HUXHAM, COLLIERY VIEWER AND MINING ENGINEER, UNDERTAKES the SURVEYING, VALUING, or AGENCY of MINERAL PROPERTIES, the WINNING, WORKING, or VIEWING of COLLIERIES, &c., on moderate terms; and begs to assure those who may favour him with their commands that all business entrusted to his charge shall receive prompt attention, and be executed with the utmost fidelity and care. References and testimonials of the highest character.

Mr. H. Huxham has room for TWO ADDITIONAL ARTICLES PUPILS, who would have an excellent opportunity of attaining a thorough knowledge of practical and theoretical mining engineering.—Cwm Rhondda, Pont-y-pridd.

GOLD MINING COMPANIES.—SHAREHOLDERS in the different CALIFORNIAN and AUSTRALIAN GOLD MINING COMPANIES are requested to CALL on Mr. F. SQUIRE, 74, King William-street, City, that he may submit to them a plan by which the shares in such companies, which are now valuable, will be again marketable.

44, King William-street, City, Dec. 24, 1857.

BRONFLOYD MINING COMPANY (LIMITED)—Notice is hereby given, that the REGISTERED OFFICE of this company is REMOVED from 2, St. Paul's, Royal Exchange, London, to and is NOW SITUATE on the MINE, in the parish of Llanbadarn-fawr, near Aberystwith, in the county of Cardigan. And all documents, transfers, and notices of whatsoever description, are to be addressed to, left with, or served upon Capt. Michael Barbary, the resident agent there.

By order of the Board of Directors.

13, Clement's-lane, London. JAMES IVES, Solicitor to the Company.

NICKEL ORES.—THE GAP MINING COMPANY OF LANCASTER, county Pennsylvania, are now ready to CONTRACT for the SALE of from 10,000 to 20,000 tons of NICKEL ORES, in lots to suit purchasers.—Address, F. S. HOEKLEY, Gap Mining Company, 70, South Third-street, Philadelphia, Pennsylvania, U.S.

M. E. S. R. S. A. J. HUTCHINGS AND CO. LTD., PATENT IMPROVED WIRE ROPE.

Original Correspondent.

VENTILATION OF COAL MINES.

Sir.—Being a constant reader of your valuable Journal, I have been waiting anxiously to see if Mr. Wales or Mr. Hopson would bring out any practical and improved mode of ventilation; but after reading over Mr. Wales's remarks and the desultory correspondence between Mr. Wales and Mr. Hopson, I cannot find that they have suggested anything to improve the system of ventilation. Mr. Wales does, indeed, admit (which all know) that the furnace is the best means that can be employed to command good ventilation. In this I think he is right, but I think he is quite wrong in advocating the splitting of the air currents to lessen the resistance in passing through the mine, as this cannot be done without diminishing the quantity. The non-splitting of the air is of paramount importance, and it is to be regretted that some of the colliery viewers are in favour of dividing the air. Such notions, coming from men of considerable experience, may tend to mislead young and inexperienced managers, for I suspect it can never influence any practical man. To say the least of it, the theory is perfectly absurd.

I assume that every one is anxious that the recurrence of such dreadful explosions as have occurred of late should be averted or prevented, and also equally anxious that some broad and settled principle of ventilation should be established; and to accomplish this practical as well as theoretical talent must be brought to bear on the subject. Where there is no fire, the managers may have as many fanciful modes of splitting and ventilating mines as they please, provided they do not overstep the proper bounds of economy; but in fiery mines they should go to the true principle of ventilating at once, and not jeopardise the lives of the colliers by any experiments when there is one fixed law to work by, which will not fail if the arrangements are proper. However, I will just remark that if there be five or ten down-east, and the same number of up-east shafts, then I have not the least objection to five or ten currents of air, if separate airways are provided for the ingress and egress of each current; but, of course, the expense must be put out of the question, and in my opinion a mine one mile deep might be managed without going to this enormous cost.

I have been a miner more than 40 years, and my experience teaches me that the true mode of ventilating fiery mines is to have powerful shafts and a powerful furnace, and the whole of the air passages driven the full depth or height of the coal, whether it be 2 or 10 ft. thick; and, if practical, should be equal in sectional area to the banks or stalls, where most of the men are at work. Under no circumstances whatever should the current be contracted to pass through pipes or bratticing to air the headings (these should be ventilated by other and well-known means), and there should be no splittings. The whole current should be made to pass one way round the works. If the air be split, the currents never can be balanced to give to every part of the works a due share of ventilation, unless, as I have stated above, there be separate shafts and airways.

One great evil in mining thick coal is the leaving the back gate-packs unmade up several yards behind the workings, and this practice cannot be too strongly reproached. I fear some of the heavy explosions have not occurred from an insufficiency of air, but from crossing the gobbing when the sulphur had accumulated, and no doubt produced explosions, instead of being made to traverse up and on the face of the works. It has been said that some of the explosions have occurred from the breaking or falling of the roof in the gobbing, but I do not believe that even this could produce an explosion if a proper quantity of air is passing round the airways and the face of the workings. The light inflammable gas will never press into and divide a cold current of air, so as to make it become explosive; this would be against all the laws of natural philosophy. The contrary would be the fact, for the density of the cold air would quite overcome any tendency of the gas to mix in dangerous quantities, as it would rub off by expansion any excess of gas that might accumulate. Some persons may ask how the packs could be made up if no material was at hand? My answer is, that if no cheaper means could be found I would build them up with coal, or, in other words, I would drive a back gate and slits as required. The workings of a thick coal will never be safe unless the packs are made up to force the air to the face of the works, and if this be done there will be few, if any, explosions, except some derangement in the ventilation takes place. To have a current of air passing through the gobbing is more dangerous than being without air altogether, unless the airways were 10 or 15 yards square, and completely filled with air. The gobbing should never have any air passing into them but that which is given by expansion from the air passing along and through the works.

I have no time for controversy, but I deemed it necessary to make a few remarks, and I should be exceedingly glad if I could be the humble instrument of suggesting anything that would be useful in the management of mines, and thereby lessen those deplorable accidents which latterly have sent so many miners to a premature grave, and caused so much distress.

Newbold Iron-works, Chesterfield, Dec. 23.

GEORGE NORBURN.

CERRO PASCO SILVER MINES.

Sir.—The district in which these mines are situated is on the Andes, at an elevation of 12,000 feet, and distant from Lima in an E.N.E. direction 52 leagues. The number of mines is said to be over 900, out of which not more than 80 are worked at the present day. From these, however, the produce is still considerable, being not less than 250,000 marcos of silver per year, = 125,000 lbs., = 5 marcos per cajon of 62½ qrs. of ore, operated upon—140,000 tons per annum, or 13½ ozs. of silver per ton of ore operated upon.

This ore is a hard siliceous gossan, and is extracted from a vein of more than 80 feet in width, and so near the surface that the operation of its extraction is more of the nature of quarrying. It is ground by large wheels of granite, 8 feet in diameter (trapiches), the expense in wear and tear being excessive—not less than \$1 per ton. When ground, it is mixed with 25 lbs. of salt per ton, and allowed to remain a day or two to incorporate; it is then spread out in the circo (or patio), and about 150 lbs. of mercury thrown into it by an Indian, who walks round and round, squeezing it through a pocket-handkerchief, and dashing it right and left, as through a watering pot.

It is then trampled in by horses, which are driven round at a gallop for seven or eight hours. These circos are 39 feet in diameter, and contain 3 cajones (18 tons) each: the pasty mass lays about 4 inches thick at the bottom. The trampling is repeated six to eight times, at intervals of from four to six days, and the stuff examined from time to time by washing off a pound or so, and adding a little magistral (roasted iron pyrites), or lime, as may be required, according to the opinion of the operator whether the metal is "frio" or "caliente." "Frio" is when the amalgam turns black, and "caliente" is when it turns to a chalky white.

When the amalgamation is considered at an end, the stuff is put into tubs and washed off in the usual manner, and the silver obtained in the form of plata pina, by means of the caparase. The loss of mercury is enormous, being not less than 1 lb. for each marc, or 8 ozs., of silver obtained, or 5 per cent. on the gross produce of the mines. Each granite wheel works at the rate of 10 revolutions per minute, and grinds a cajon (3 tons) in 24 hours—10 of them are driven by a 20-horse steam-engine on the establishment of Mr. Jum. From the assays made on these ores and their relaves, it is the general opinion that only two-fifths of the silver contained is extracted by this process, the remaining three-fifths being lost in the relaves.

Within a short distance of the town of Cerro Pasco are large deposits of good bituminous coal, which is delivered at the mining establishments at the rate of about 15s. per ton. Good iron ore is also found in the immediate neighbourhood of this coal, from which Colonel Lloyd smelted excellent pig-iron in a small cupola furnace (constructed of excellent fire-clay, also found in the neighbourhood), in the year 1851. Previous to this time an idea had existed in the mind of the miners that the necessary amount of heat could not be obtained for smelting iron, owing to the extreme rarity of the air; but, upon the application of a small-fan blower (by which the necessary amount of oxygen was forced through the furnace), the colonel experienced no difficulty whatever from this source.

Argentiferous antimonial galena exist in great abundance, but have never been worked, in consequence of the obstinate adherence of the natives to their antiquated system of amalgamation, and their almost entire ignorance of the beautiful modern system of smelting ores of this character.

It would appear that, as no material should be wanting that might contribute towards perfect success in metallurgical operations in this highly favoured district, limestone of the very best quality is found in great abundance, in immediate approximation with the coal and iron; while an ample

amount of salt is supplied, at a moderate price, from an almost inexhaustible deposit a few leagues distant.—Valparaiso. W. T. RICKARD, F.O.S.

MOROCOCHA SILVER MINES.

Sir.—These valuable mines are situated on the Cordilleras, at an elevation of 14,000 ft., three days' journey (about 40 leagues) from the city of Lima. They produce a rich antimonial silver ore (ross clar), in a soft silico-argillaceous gangue, yielding by assay from 80 to 100 marcos of silver per cajon. At present the proprietors are unable to reduce the silver, and, consequently, are obliged to send the ore to England, at a cost of 60/- per cajon.

In the immediate neighbourhood is found an abundance of galena and antimonial galena; a sample of the latter gave on assay 51 per cent. of lead, and 231 marcos of silver per cajon. Wood and coal abound in the vicinity of the mines; also fire-clay, suitable for the construction of fire-bricks and furnaces. Limestone of first-rate quality is likewise found within a short distance of the mines. Native carbonate of soda, of excellent quality, is found on the coast south of Lima, and is sold in that city for \$2 4/- per quintal, and can, consequently, be delivered at the mines for \$9 4/- Under these circumstances, the lead and antimonial ores can be reduced with great facility on the spot, and with them the silver ores can be smelted, as is now done in England, and as is also done by the Indians in the vicinity of Tanly, about a day's journey towards Cerro Pasco, in furnaces of the most primitive character, and without fluxes.

Ores stolen by the workmen at Morococha are carried to this place, and the silver extracted by simply mixing the powdered ore with the galena, volatilising the sulphur and antimony, and cupelling the resulting lead, *all in the same furnace*, and this with simply a fire of tachio (sheep's dung). Necessarily all the lead, and a large proportion of the silver (probably one-half), is lost in this crude operation; but it serves to demonstrate how economically and rapidly the silver might be extracted from the ores of Morococha, were a good modern system of lead smelting introduced. It is calculated that by judicious and economical management of this process, the lead produced will pay all the expenses of both its own and the silver extracted by its agency. W. T. RICKARD, F.C.S.

MANUFACTURE OF CAST-STEEL.

Sir.—I last week forwarded to the office of the *Mining Journal* some specimens of my cast-steel, purified and prepared from various kinds of pig-iron. There are two specimens manufactured from Forest of Dean Iron Company's coke iron, made at Parkend Iron-works. These have been twisted cold, to show the tenacity of the cast-steel, and to disprove the common opinion now entertained, that only charcoal iron or spathose iron can afford such samples of cast-steel. Another specimen of cast-steel is from coke iron manufactured by Messrs. Baring Brothers and Co., at Tew Law Iron-works. Another is prepared from forge iron made at the works of Messrs. W. and G. Firystone, Brierly Hill; and a fourth sample is produced from the foundry pig-iron made at the Victoria Iron-works. There are also some small twisted bars of cast-steel, made from cinder pig-iron, manufactured at the Ebbw Vale Iron-works.

There are some small octagon and flat bars of my cast-steel, drawn from the pipe, or hollow ends of the ingots, and the hollow runs from end to end of each bar, showing the great tenacity of the steel at a red-hot, which could thus be drawn hollow, under a heavy tilt hammer, without bursting in the edges. These bars or rods are equally cold tough.

There are also samples of cast-steel from Indian and Acadian pig-iron, and some from deoxidised iron ores. There are a number of soft cast-steel blooms made from the Ebbw Vale Iron Company's foundry pig-iron, with a waste not exceeding 25 per cent., even upon the small and insufficient scale of operations adopted. From some of these blooms, Mr. T. Allaway, one of the leading tin-plate manufacturers of this country, had several tinned plates rolled and finished, which he brought to me himself, and pronounced to be equal, if not superior, to anything produced from the most carefully prepared charcoal iron.

Taking the cost of the foundry pig at the Victoria Iron-Works at 80s. per ton, the cast-steel ingots ready for rolling into these tin-plate blooms would cost about 6d. to 6d. 10s. per ton; and it must be observed, that beyond the waste in purifying, and which, on the large scale, need not exceed 20 per cent. upon the pig-iron; there is no further waste except the scaling of the ingots in rolling into suitable blooms, and the blooms can be rolled at any heat.

I sent some hundredweights of these blooms to the Pontypool Iron-works, to be tested for tin-plates, but as I have heard nothing of them for eight or nine months, I may conclude that, like my inventions, they were deemed of too little importance to warrant any trial being made of them at those works. Such as they are, the public can judge of their merits, and those who have the curiosity are welcome to test them; and though beneath the notice of the wealthy Ebbw Vale Iron Company, they may interest some less fortunate manufacturer of tin-plates.

In conclusion, I should wish it to be understood that I have not the least desire to puff or parade my inventions—from it; I was solicited to send specimens to the Great Exhibition, but I steadily refused to do so. I should not even now have brought forward either the subject or the samples, but I felt that I ought, as the son of the late Mr. Musket, the author and originator of the first intelligent ideas and principles of the iron and steel manufacture, to vindicate my inventions, crushed, stifled, and suppressed as they have been by unboundable wealth and influence, in order to confer upon the patentee of an amateur for the manufacture of cast-steel, and upon that process itself, the rewards and the merit due solely to myself and to my inventions. The other of influence and capital to carry out my processes, promised again and again, by the most wealthy, the most powerful, the most enterprising, and the most honourable firm in the iron trade which has ever existed was repudiated with cool contempt, and without an hour's notice, when it was supposed that it had communicated to them all that was worth knowing respecting the manufacture of cast-steel. If they had fairly, honourably, and with energy, patented and carried out my processes, according to their reiterated promises to that effect, 1-10th or 1-20th of the profits would have been deemed by me an ample recompence for my services and inventions.

After communicating to the Ebbw Vale Iron Company processes and inventions which I valued at the lowest estimate as worth 100,000/-, and which are or were valued still more highly by that firm, if I may judge from the tenor of a multitude of their letters now in my possession, I am dismissed from their service, not only without an hour's notice, but with the cost of three months' experiments thrown upon my hands. I confess I am surprised and astonished that a body of men, who stand as it were at the head of the iron manufacture of the whole world, should so far forget, not what is due to me, but to themselves. No individuals, however wealthy and powerful, can afford to cast aside sincerity, honour, and good faith with impunity, in dealing even with a poor inventor.—Cofield, Dec. 23. ROBERT MUSKET.

THE IRON QUESTION.

Sir.—"Justitia" still volunteers his information respecting Mr. Roper. "He will most likely be found at his post, on the site of the future cast-house, where he intends making 10 tons of very superior steel per diem." The idea is grand, and big with classic inspiration. Marus weeping over the ruins of Carthage, and Roper meditating on the site of the future cast-house, are kindred incidents in the lives of these remarkable men.

"At his post?" How full of meaning is this sentence, and yet how enigmatical to the uninitiated. In the bleak region, which stretches far beyond the Tropic, the patriotic inhabitants were, in days of yore, frequently found "at their post," in fact, it is recorded that posts were set up in public for them to resort to. Probably the Atomics have erected a similar "post" for Roper's behoof, on the site of the future cast-house. "Justitia" does not understand my allusion to a "certain gentleman," and this is not surprising, for educated as he was—at a seminary where the boys were pinched when they made "bad puns"—poor "Justitia" must have suffered fearfully, and has, no doubt, a voluntary dread of anything factitious. I am not particularly anxious to know what Mr. Roper is doing at present, but when he is making 10 tons a day of very superior steel by the atomic process may I be there to see, but in disguise, for fear of a "red-hot tongue."

Whenever the manufacture of cast-steel is successfully carried out, and when good cast-steel is actually made at Ebbw Vale, it will not be done by the aid of the Uchatus process, or through any knowledge of the matter possessed either by the Uchatus agents or by Mr. Roper; but in virtue of a very complete set of papers supplied to Mr. Brown by myself, on the subject of cast-steel, detailing the manufacture of it, by my various processes, and embodying a mass of information which would enable any practical man to make first-rate cast-steel at Ebbw Vale, by at least a dozen various methods, each one of them superior in utility and economy to the atomic plan. With these papers, embodying practical results for his handbook, Mr. Roper may make plenty of steel, and good steel too. As I purpose publishing these papers at a future season, with notes and additions, Mr. Roper will then have the benefit of my printed, instead of my written, instructions to guide him.

The atomic process having excited a good deal of attention, I think of giving the details of my late father's first experiments upon this subject, made and recorded by him in 1799, when at Clydeside Iron-works. It has been very generally supposed that in his papers on iron and steel my father had given to the world the most of his knowledge and information upon these subjects, instead of which that volume is merely a collection of some of his early papers in the *Philosophical Magazine*, which were being republished without his knowledge, and to which he subsequently was induced to add a preface, and some notes.

I regret that I cannot oblige "Justitia" by repeating my challenge to the Atomics:

Science forbids me, and I stand corrected for having already so far forgotten myself as to invite her devotees to a trial of skill for the sake of sordid gain. My friend, "M. D.," to use the classical phraseology of "Justitia," "appears" "shut-up." Where are his promised theorems, which were to reduce my processes to absurdity? Where are the curiosities which his analytical research has discovered latent in my steel? Has he found traces of the pernicious hypophosphomolybdate acid therein? Has he in error assigned to the presence of xanthoproteates of lime the phenomena due to

the co-existence of chlorinated chloromolybdate, polychromate, and salicale acid in my ingots of steel? I trust that no mistaken feeling of delicacy may prevent "M. D." from giving, to an admiring public, the details of his profound researches into the nature and properties of steel. His forthcoming paper upon the magnetic nodes of garnet need not be read with intense interest.

R. MUSKET.

THE MANUFACTURE OF STEEL.

Sir.—The discussion which has recently taken place in your Journal with reference to the Uchatus and Bessemer processes induces me to forward you some remarks which, I think, may not be uninteresting to your readers. Sometime since a very fair paper was read at our Literary and Philosophical Society, by Mr. Wm. Baker, F.C.S., on the Manufacture of Steel in Austria. The greater portion of this paper was a translation from the *Freiberg Mining Journal* of Mr. Tanner's observations upon recent improvements. In reviewing the constitution of pig-iron, steel, and wrought-iron, he says that, roughly stated, pig-iron contains from 3 to 5% per cent. of carbon, wrought-iron is nearly free from carbon, and that steel is between the two. Steel, however, cannot be defined by the simple statement of the proportion of carbon, but must be referred to some characteristic physical properties.

England cementation is considered as the only method of producing steel, and other methods pursued in some parts of Europe are looked upon as crude and old-fashioned, although the quality of the article produced was acknowledged to be excellent. The cementation process is considered by Germans as new, and simply on its trial against the *rohstahl* smelting. The "Austrian German steel" has during the past twenty years been successfully rivalled by several other kinds, such as cast, cemented, puddled, and malleable cast. The old method of producing steel was to refine iron in a furnace similar to an open forge, somewhat lower than the blast than usual in refining iron. Cast-steel is the most dangerous opponent of this refined steel in Austria, for the manufacturers having neglected the careful assortment produced uncertain results, and but seldom first-class steel. Successful trials have been made at Neuberg to fagot German steel and convert it into refined steel, but the product could not be compared to a mass of cast-steel when uniformity of texture was the question. Tanner presumes that a few enterprising manufacturers would render Austria independent of other countries for machine cast-steel, and this, I think, no will displease.

So far you will see that the opinions given by "Eisenstein" and others in your *Journals* are substantially correct, and whatever Messrs. Green, Musket, Bessemer, and Sidero may say, I am convinced that unless the raw material be adapted for the manufacture of steel, not one of their inventions will aid them in producing a marketable commodity, much less a substitute for the better description of steel. It is here, I think, that Uchatus is in advance of all others; he claims the production of "cast-steel from pig-iron by the use of fluxes at one melting," and this will allow him to succeed better than others, for he reduces the question to a simple chemical problem, while Messrs. Bessemer and Musket appear to rely rather on chance than anything else, for they seem to consider that one flux will produce a satisfactory result upon all the irons if it will upon one description—indeed, they may be compared to the advertising doctors (1), who recommend a pill or potion to cure all diseases.

If it be allowed that the raw material is the true cause of good steel being produced, it must be admitted that all that is required to secure the most glorious success to Uchatus is the discovery of an artificial compound containing the same elements and in the same proportions as natural *stahlstein*, from which the best German steel is produced. There can be no doubt that the formation of such a compound is no easy matter, but I cannot think it is impossible. Moreover, I am convinced that the probability of success is considerably greater in this direction than in the mysterious chemicomechanical processes which are advocated by Messrs. Bessemer, Musket, Binks, Sanderson, &c. I have no intention of entering upon a personal discussion with those whose greatest delight seems to be to attack persons and leave their processes unnoticed, but I certainly think it would be highly interesting to all concerned if the four gentlemen already named would state how far they rely on their chemistry, and how far on their mechanical arrangements for success; and it might then be decided to whom we are indebted for the great improvements which have recently been made. I do not call upon Uchatus for any explanation, as his purely a chemical process, and his failure to produce marketable steel from British pig-iron can only be attributed to his ignorance of the character of the iron to be treated in the first instance, and his want of sufficient chemical knowledge to form the necessary steel-producing combination when the character of the iron is ascertained.

The mineral from which the natural steel of Germany is produced is a carbonate of iron of a peculiar character, and without it would seem difficult to produce a steel of equal quality. Perhaps the greatest progress that has been made in the manufacture of cheap cast-steel has been made in Rhenish Prussia, and first among manufacturers stands Krupp, of Essen, who uses the puddled steel of the Siegen district, and especially that produced at the Lohne Works, as hieraw material: this when converted into *gussstahl* supplies the hardware works of Solingen, Remscheid, and Ennepetal, where the activity of the population may be compared to the industry of bees rather than anything else, although it is less than 20 years since Sten-gele made the first attempt at Kamp and Hesterburg's works, on the Ruhr, to convert the Siegen and Müsener iron into steel. Since then, however, Geeswiede, Limburg, Hesse, Schlebusch, Hörde, &c., have become regular metallurgical districts, and it is difficult to say what advantage Prussia will reap from her abundance of limestone.—Sheffield, Dec. 17.

WESTPHALIAN.

Sir.—Mr. Green has read Mr. Bessemer's patents, and so have I; and with respect to that one bearing date March 15, 1856, I find that Mr. Bessemer claims, for methods of assisting the decarbonisation and refinement of fluid cast-iron by the use of oxides of iron, and for the use of carbonaceous matters during such process.

In carrying this into practice, he says that he forces on to, or into, the fluid metal carbonated gases. Probably a little gunpowder might be used with greater safety than these gases. Again, he says he introduces fluid or solid carbonaceous substances in sufficient quantity to combine with any oxide of iron that may exist in, or

veterate red-shortness and cellular structure of the Bessemer ingots is actually the introduction of a small dose of metallic manganese alone, or conveniently alloyed with iron and carbon, into the purified metal. Mr. Bessemer with his four months' priority of knowledge, and as the "Heaven inspired conqueror of obdurate matter," should, nevertheless, in his grand patent have merely observed that oxide of manganese may be used to assist in purifying the iron, and that when people want to make alloys, they may put the metals to be alloyed into the purifying vessel. Now, Mr. Green, if you are able to twist and torture this into an anticipation of Musket's patents for adding metallic manganese, and an alloy of iron, carbon, and manganese, to de-carbonize purified cast-iron, you will prove yourself an able inventor than either Musket or Bessemer.

Does it prove that a man knows what is essential because he strings together haphazard a number of matters which are not essential, nor any more efficacious than a compound of, or containing, "brick dust and tressle, lucifer matches and birch boughs," whilst he neglects to name the one substance which alone can enable him to accomplish successfully the purpose of his invention. I fear, Mr. Green, you are upon the horns of a double dilemma, and I advise you, when you next attempt to invalidate a clear and indisputable claim to novelty in any patent process, to make yourself master of the subject first; and when you learn to distinguish oxidized from non-oxidized substances, and comprehend that their effects are diametrically opposite in many instances, you may proceed to lecture upon the merits of Bessemer's and Musket's processes, without committing yourself by raking up the blunders of your favourite inventor to hurl them at the head of your antagonist, and the recoil of which must cover both yourself and your champion, not with glory, but with ridicule. But let me once more do justice to Mr. Bessemer's talents. He discovered that cast-iron could be decarbonized and heated by forcing cold air through it, until it became fluid malleable iron. This is the most extraordinary metallurgical discovery ever made, simple as its chemical explanation really is, and the simplicity of the process is its chief beauty. Mr. Bessemer's revolving purifying vessel is also a most ingenious and interesting invention, and his command of mechanical combination is great and extensive; but as regards any knowledge of iron and steel, apart from his one great invention, I have searched for it in vain throughout his most voluminous and elaborate works. I now bid adieu to Mr. Green, who, like my friends "Justitia," "Ingot," and "Pollux," has probably got his "quidus est," "Requisitus in pace." SINDSOS.

STEEL MANUFACTURE—MUSHET, BESSEMER, AND HEATH.

Sir.—It does not require a very great stretch of the imagination to discover that Mr. R. Musket is fond of a joke, seeing that he is willing to saddle himself with his own puns. Now, that he is mounted upon his favourite iron hobby-horse, and clad in his "habit of observation," with pen behind his ear, and the critic's whip in hand, methinks the spirit of Don Quixote might well arise and quake for his master's laurels.

The anecdote about the old scrap-iron dealers, with which he last week edified us, was exceedingly interesting and characteristic. They being a very enlightened and scientific class of men were, of course, well qualified to pass judgment upon a new discovery, involving deep scientific and chemical principles. By-the-bye, when and where did Mr. R. Musket hear the acute observations about the "burnt iron" with which he has favoured us? When and where did the old scrap-iron dealers have the opportunity of giving utterance to their very enlightened observations? When and where were they asked to purchase any of the said burnt iron? and how did they know that "their customers did not like it"? Have you been burning iron, Mr. Musket? If so, take heed how you do so next time, lest you also burn your fingers. It is at all times a dangerous thing to play with the fire, especially when there is fluid iron therein.

As regards the very grave question which Mr. R. Musket puts to me as to the reason why Mr. Bessemer did not combine fluid manganese with the air-purified iron, and also as to the reason why he did not take out a separate patent for the same, I would beg to state the answer is a very simple one,—in the first place it is obvious that Mr. Bessemer was aware of the importance of employing manganese with the air-purified iron as early as May 31, 1856, for in his patent of that date he says:—

"In the treatment of different iron by the process of forcing atmospheric or other oxygen therein, it will be found advantageous in some cases to use such fluxes as will not act upon the different bases associated with the iron; in this way small quantities of lime, silica, or alumina may be added with advantage; and so, in like manner, chloride of sodium, iron scales, oxide of manganese, and other salts or fluxes may be used to assist in the separation of the impurities contained in the crude metal as have before been used for like purposes, and the application of the same not claimed by me under the present letters patent." As to the reason why he did not claim the use of manganese, or take out a special patent for that particular object, is also equally clear.

The law requires that every invention for which a patent is granted shall possess at least two prime requisites—*novelty and utility*. As regards the utility of the admixture of manganese with iron in the manufacture of steel there can be no question. But to whom belongs the merit of the discovery—Musket or Bessemer?—To neither. Mr. Josiah Marshal Heath, of Kensington, in the county of Middlesex, was the man who first made the discovery; to him letters patent were granted in the year 1839, and to him, therefore, all the merit is due. The third feature of his invention he says consisted in "the use of a certain portion of oxide of manganese in the process of converting cast iron into malleable iron by the process of puddling; and fourthly, the use of carbure of manganese in any process whereby iron is converted into cast-steel." But not only was the employment of the carbure and oxide of manganese specially claimed by Mr. Heath in the manufacture of malleable iron and the conversion of iron into steel; he also proposed to make use of the triple compound of iron, carbonaceous matters, and manganese. He says:—

"I propose to make an improved quality of cast-steel by introducing a crucible bars of common blistered steel, broken as usual, into fragments; or mixtures of cast and malleable iron, or malleable iron and carbonaceous matters, and with from 1 to 3 per cent. of their weight of carbure of manganese." Nor can the meaning of the above claims be disputed, or shorn of their real significance. Mr. Heath formed no exception to the general body of inventors.

As soon as the value of his invention became known he was pounced upon by sharks, who, wishing to make up for their want of brains by the weight of their purse, and the amount of their immodesty, let loose the dogs—not of war, but of the law—upon him. But as Mr. Heath's iron and steel came out of the furnace well, so, in like manner, did he. In the case of Heath v. Unwin it was held by the Judges of the Exchequer Chamber that not only the use of carbure of manganese itself, but also of its element—oxide of manganese and carbon—when applied to the manufacture of steel, was an infringement on the patent.

How, then, in the name of common sense could any man, with such facts before him, think of throwing away money upon a patent for so well-known an invention. Perhaps, therefore, the light of these facts will help Mr. R. Musket to discover the reason why Mr. Bessemer did not claim, in his patents, the use of manganese or the triple compound. It will also help him to see that there is no occasion for me to point out to Mr. Bessemer the distinctive merits of the several compounds and admixtures mentioned in his patents. Mr. R. Musket has, I fear, fallen into an error, unfortunately too common with patentees—of supposing that he could claim the application of a known process to a new purpose. It has, however, been decided in law that this cannot be done unless a *necessary* alteration or addition be first made in such said process. And in the application of manganese or the triple compound to air-purified iron, Mr. Musket has not, I think, either shown or made such necessary alteration or addition.

And, now, as to the Martin gutters, Mr. R. Musket says—

"Suppose the inclination of the gutters to be small, the number of perforations very great, and that the gutter has sides, and is covered over, may not the iron be purified to any desired extent, flowing from the gutter into any convenient heated receptacle?" As regards the gutter described by Mr. Musket, I would merely state that I conceive it to be possible to make a channel of such a breadth, length, and depth, and to place it at such an inclination as to be equivalent to the Bessemer receptacles; and if this be done, and the fluid iron be operated upon for a sufficient length of time, and with a proper blast, of course the purification of the fluid iron would take place. But would not this be a mere colorable evasion?—Unquestionably it would. As to the purifying of fluid iron in three minutes by means of jets from a number of holes of one-sixteenth of an inch in diameter, of course I can say nothing. Mr. Musket says he has done it, and I, of course, cannot say he has not. I must think, however, that he had a very good tempered charge of iron to operate upon. I should like to know, by-the-bye, how far the chemical properties of the iron were tested upon or changed by the air in that space of time? Did Mr. R. Musket subject to analysis portions of the said iron without the air purification, and also with it? If so, he can, of course, tell us how far it was improved by his very expeditious process. Certainly it would be a grand sight to see fluid iron so far improved in value, whilst flowing down a series of gutters, as to produce from one blast-furnace 100,000/- per annum. And it is also somewhat surprising that such shrewd men as the Ebbw Vale Company should allow such a chance of making money to escape their grasp.

As regards the experiments made at Darkhill, by the late Mr. Musket, I merely repeat Mr. R. Musket's own words. As I did not know accurately when those experiments were made I, of course, could not have said that he witnessed them in 1819 and 1820. If Mr. R. Musket did not witness those experiments he certainly gave us reason to infer that he had, and that he was in petto at the time.

As regards my observations on the oxide of iron and phosphorus, and my qualified concurrence with Mr. R. Musket's views in respect thereof, I certainly cannot see anything so very illogical as he would make it appear. I have taken his advice, and put on a "habit of observation," and am still as far as ever from arriving at the pith or import of his reasoning. If he or I squinted out of one eye and could not see out of the other, I should say that that the blind eye was the greater evil of the two. It would not follow, however, that the squinting eye was not a valuable, though a defective, member of the human system.—Caledonian-road, Dec. 22. WM. GREEN.

QUARTZ CRUSHING, AND ITS MACHINERY, IN AUSTRALIA.

Sir.—When quartz reefs were first discovered to be auriferous in this country, so inferior were the crushing machines then used, that scarcely one claim out of twenty remunerated the reeler for his industry; and when, at last, manual as well as horse-power were exchanged for steam-power, it was reckoned a good machine that could crush 1½ tons of raw quartz per day, those machines being chi-ry on the Barden and Chilian principle, which required the quartz to be broken very fine before being put into the machine. The price per ton for crushing at that time being 7/- or 8/-, it would require good quartz to enable the reeler to pay his expenses in procuring the quartz and getting it crushed. How many in days of yore have spent their last shilling in prospecting reefs that would not pay for crushing! Had the present machinery been in operation at the commencement, there is no doubt but that many an unfortunate reeler would have been highly compensated, instead of losing his all; but with a reef that will yield 1½ oz. to the ton, the reeler may get good wages.

In reference to quartz crushing machinery, I believe the Barden crusher to be one of the first propelled by steam in this colony; and if capable of crushing 3 tons of raw quartz in 24 hours, it was considered good duty. This machine re-joined two men in attendance, and generally has a revolving amalgamator. The next to notice is the Chilian wheel, sometimes combined with small stampers or gratings, which requires the quartz to be put under the stampers and wheels very carefully, by a man with a shovel. The wheels of some of these Chilian mills are upwards of 2 tons, and when attached to a steam engine they cost as much, if not more, than any machine now in use; and if calculated to crush 6 tons of raw quartz in 24 hours, it is called a good machine. The amalgamators of the Chilian mills are on various principles.

I notice lastly the stampers on the Cornish principle, whose superiority is obvious, having existed for hundreds of years in stamping tin ores, which require to be crushed as fine as any auriferous quartz for extracting the ore. The stampers on the Cornish principle in this country are about 6 cwt. each, stamping on a cast-iron bottom (commonly called covers) of 9 cwt. The quartz is crushed as fine as the sand on the sea-shore. Being crushed in water, it is forced through the gratings when reduced to the required size. The quartz, when brought to these stampers, is tipped from the dray into a pass, which holds upwards of 6 tons, and feeds the stampers of its own accord. The amalgamator of the Cornish stampers is on the shaking table system, and is believed by all parties who possess them to be the best mode of amalgamation,

The power of these machines varies from 4 to 12 horse-power engines, with a proportionate number of stampers. In taking a machine with 12 stampers for a company, I say, from personal experience, it is capable of crushing upwards of 24 tons of raw quartz in 20 hours, with the same steam-power as an ordinary engine driving the Chilian wheels, and with less expense in working. I know there have been many objections to the Cornish stampers, and also to the shaking table for an amalgamator, yet I am fully convinced of its adaptation to quartz crushing. Our engine is of 11-horse power, with eight stampers of 6 cwt. each, by which we are enabled to crush 9 tons of raw quartz per day, and the same at night.

Fryer's Creek possesses as good machines as this country can produce. There are four on the Eureka Reef, erected on the old Cornish principle, under the management of Mr. Gross, a respectable practitioner in the Cornish tin mines.

It has been recommended that machinery be erected at convenient places throughout the district, by the merchants of Castlemaine. It is obvious that such companies can but seldom, if ever, prosper. We have seen too many failures of such companies. It is the general opinion that such companies should be composed of practical men, who are not only capable of putting up machinery to crush quartz, &c., but should also be able to carry out mining in all its branches. Those share companies have often more agents and clerks than working men to obtain the auriferous soil. It must be a combined party of practical miners and mechanics, to make the required improvements on quartz reefs, and develop the golden resources of this thriving colony.

HENRY TREGELLA, Engineer, &c.

Emu Steam Stamping Company, Fryer's Creek, Aug. 24.

THE ESTON IRONSTONE MINES, YORKSHIRE.

SIR.—Many false reports concerning these mines, which belong to Messrs. Bolckow and Vaughan, have lately been in circulation, to the effect that they were dangerous to the workmen, and mismanaged by the engineers, which reports have had a very prejudicial influence on the workmen who are employed here. From my own knowledge of the place, I am enabled to state that the mines are not dangerous, neither are the works mismanaged. Accidents have occurred here; and where are the mines in which accidents do not occur?—but in many instances these were owing to the carelessness of the workmen, and not to the mismanagement of the engineers, as has been alleged and reported. Three or four men are employed to go round the works, to prevent the men working where any danger is visible; in fact, more care could not be taken of men's lives than is taken here.

The mining engineering department is superintended by Mr. J. Marley, whose plans are carried out by Mr. Charlton, the under-viewer, and which are the most complete I ever saw. The principal part of the ironstone is run down the hill sides by self-acting inclines, and the daily quantity worked is 2200 tons. The mines are worked economically, cheaply, and safely. Great credit is due to Mr. Marley, whose plans are faithfully carried out by his officials.

A MINER.

Guisborough, Dec. 22.

"LAWYER-STEWARDS."

SIR.—I was glad to see in your Journal, some short time since, a letter from "An Agent" (Cambridge). I believe that Mr. John S. Enys has set an example which will ultimately be followed by all the other principal landowners in the country, as it will become apparent to them that lawyers are not the men for stewards. A lawyer may be very well in his place to advise on points of law, but as a land steward he is an unfit person. A steward, in my opinion, should thoroughly understand the value of land and, not trust too much to others. He should devote a great portion of his time to defining boundaries, setting up landmarks, and visiting the tenants, to advise them as to any improvement which might be suggested, as it is often the case that an improvement might be made to benefit both landlord and tenant; and provided the tenant comes forward, so far as he may be interested, I think the landlord or steward would do well to follow and assist him in carrying out the same. A steward should endeavour to avoid all disputes that might lead to litigation, instead of (through his neglect) leading his employer into an action of "expenses of which," in many cases exceed the value of the land disputed. I have known instances where the lawyer-stewards have been in the habit of receiving the rents for many years, without ever having seen the property for which the rents were paid; and it is on this account, in my opinion, that farms and tenements are too often impoverished, instead of improved—no doubt the exorbitant charge for the lease has been paid, and they, therefore, appear satisfied.

I believe that lawyer-stewards have also been a very great preventative to mining, since you will find that they charge a high fee for their services, and otherwise endeavour to put money into their pockets, have been the means of disgusting those who would legitimately enter into mining speculations, and thereby realize considerable due to the owner, as well as dividends to the speculator. We should naturally conclude that lawyers would the rich men, so far as this world is concerned, but what a rare occurrence!

AN AGENT.

CHOLLACOTT CONSOLS MINE MANAGEMENT.

SIR.—An error having crept into a late Journal, in which it was stated that Mr. Wolferstan was about to superintend the Chollacott Consols Mine, we, the acting members of the committee, beg to correct so erroneous an impression. It is wholly destitute of even the shadow of a foundation. Capt. Carpenter has the completest confidence, not only of the committee, but, we venture to assert, moreover, of the great bulk of the shareholders in this property.

THOMAS ORTON.

ANTHONY BINNS.

PEDN-AN-DREA MINE, AND ITS MANAGEMENT.

SIR.—It is with considerable reluctance that I ask you for a small space in your Journal; still, duty bids me do it, as it is the best means whereby I can lay before my fellow-adventurers a statement of facts that may throw some little enlightenment to the shareholders.

Representing above 1000 shares, I went, on or about Oct. 29 last, with an order to go underground, which I presented to Capt. Carpenter. After being kept waiting for an hour, during which time I had to endure much annoyance from two gentlemen in the shape of purser and manager, I was informed that the pitman would go down with me (though there were two agents on the mine, neither of whom could go with me, notwithstanding the innumerable satellites by whom they are surrounded, and to whom their work is deputed).

After I found that it was useless to endeavour further to prevail on our manager to go himself, or allow Capt. Thomas to do so, I went with the pitman, who, I have since learnt, carried out his instructions to know nothing, and tell equally as much, and also to caution the men to tell nothing.

To-day I have, in consequence of certain statements, which have been made to me by a good authority, been to the office on the mine, and requested to see the tribute gettings of the men, in order to prove or disprove these statements. I was refused permission to see them without an order from the secretary in London, whom I regard as having no authority in the matter, as I, being a shareholder, claim a right, and doubly so as one of the local committee. I have yet to learn, Mr. Editor, that either secretaries, managers, or clerks, have the power or justice on their side to refuse me, since all shareholders are liable for their proportion of liabilities. I was not only obliged to return without seeing the books, but was positively told that I could not see them in this or any other time without an order (what a glorious place of freedom is the Pen-an-drea account-house!), and was obliged to bear the insults and threats of a committee to the care of our police for my impetuosity in visiting the mine, and looking after my own and friends' property. Well may we ask, in what century are we living, and to what clime of absolutism have we been transferred?

We must pay, but ask no questions.

I would also add that, during this year, we ought to have had 4000/- or 5000/- in the shape of dividends, had the mine been managed properly and economically. Let the shareholders see to it.—Redruth, Dec. 21.

H. WADDINGTON.

PEDN-AN-DREA UNITED MINES.

SIR.—Understanding that certain parties are again reflecting on the management of these mines, which, but for the unpreceanted fall in the price of tin, would early in the year approaching to more than paying cost, if not in actual dividends, send you a full copy of the report of the local committee, resident on the spot, dated Dec. 18, which speaks to the purpose.

SAMUEL CARDEN, Sec.

Old Broad-street, Dec. 23.

PEDN-AN-DREA UNITED MINES, REDRUTH, Dec. 18, 1857.

COMMITTEE MEETING.—Present: Mr. Wm. Vivian (in the chair), Mr. Lockyer, Mr. Reynolds, and Mr. W. Waddington; Mr. W. P. Carden, and Capt. Carpenter.

Minutes of last meeting read.—Agents' last report read.—It appears to this committee that the operations are being carried out with energy, and the reports of the agents of the underground department considered satisfactory. The serious falling off in the price of tin has been the means of the loss for the months of Oct. and Nov.

The committee urge on the agents the necessity of exercising increased energy, and of reducing the costs by every possible means which should not interfere with the proper working of the mines.—Wm. VIVIAN, Chairman.

[We have inserted the above communications; but it certainly appears to us that Mr. Waddington, having been present at the meeting so recently as Dec. 18, ought there to have brought any matters of complaint before the committee.]

IRON NOTES.—THE FIRST IRON VESSEL.

The first iron vessel was built by John Wilkinson, and launched at his wharf, Broseley, on the banks of the Severn, in October, 1788; her construction was watched very anxiously, and much interest was felt in the possibility of her floating; however, she proved perfectly tight, moved very easily on the water, and drew about 8 in. with very accompaniment on board. Wilkinson was a veritable iron man, being largely interested in iron manufacture, and disappointed by a boat builder, he fulfilled threat, in building his iron barge; he first used hot iron, but it "burnt his leather barge." He made "iron men" to get the deep coal, then just coming into use, but the colliers, believing the point of danger to be the point of honour, swore they would not "set the trees," and that "if Wilkinson's men were to do the one they would do the other." He was the friend of Boulton and Watt, and made the castings for their mammoth Cornish engines, before they commenced the Soho Works. Wilkinson believed in iron, he had faith in metal, and desired to be buried in it, and kept two iron coffins ready in his house, for himself and daughter. Wilkinson's father first introduced iron below, or blowing tubes in blast.

The first iron vessel for the Thames was made by John Onion and Son, of Broseley, at their works at Brierley, near Stourbridge, and sent to a Mr. Bishop, in London, about the year 1810.

The first iron bridge was constructed by Mr. Darby in 1799, at the Coalbrookdale Ironworks.

The first iron rails were cast by Richard Reynolds in 1765, and laid down from Coalbrookdale to the Severn. The price of iron

above. These mines have been very productive in copper, and worked very extensively, but I have confined my report to the principal objects in pursuit; it would make it too complicated to detail the same, and I may still bring it into a narrower compass, by saying the eastern part promises to make a lasting and valuable mine, but the 162 cross-cuts westward are of a more speculative character. Taking the whole into account, it is well worthy of a further expenditure of 20,000. In conclusion, I particularly bring to your notice that a vigorous working of the mines will be the most economical.—J. WEBB.

The CHAIRMAN said they had heard the reports, and he could only say that the first one coincided with what he had frequently stated—the key of the mine was the 161: if they were right there had a good mine, and if not the sooner they gave it up the better.

Mr. SUTTON suggested that they should adopt the report of the committee, which would have the effect of sanctioning two captains to inspect the mine instead of one.

Mr. SMITH felt that they were deeply indebted to the committee for the able manner in which they had conducted the proceedings.

Mr. SUTTON, as one of the members of the committee, felt a great interest in the concern, both in a pecuniary point of view and for the general benefit of the shareholders, who had expended so large an amount upon the mine. He should have been more pleased if they had had a better report, but the object was to have an honest one, and he hoped their prospects would improve for the future, after giving a fair trial at the points mentioned in the reports. After that had been done the question would come before them whether they had better throw more good money after bad? But he (Mr. Sutton) was not inclined, at the present time, to give it up.

Mr. SMITH considered nothing could be better than the course adopted.

Mr. KING said it must be satisfactory to the committee of management and Captain Dale that in the reports there was not a single thing suggested that was not being done, or not been done. There was no variation in the works proposed by the two captains who had inspected the mines.

The CHAIRMAN said he would propose that the report of the committee of shareholders be received and adopted, and the best thanks of the meeting was due to them.

Mr. SUTTON said they were especially due to Mr. Charles, who had been a most valuable member.

The resolution was then seconded, and carried unanimously.

Mr. ELLIOTT was exceedingly obliged to the meeting for this kind expression of feeling to the sub-committee, and it was very gratifying to find that they had carried out the instructions to their satisfaction. The only object of Mr. West when he brought forth the motion was to ascertain their position and uphold Capt. Dale, and the result must be very pleasing to him, as there was not a single new suggestion made either by Capt. Granville or Capt. Webb, and the work mentioned in their reports was either done, or in the course of being done, by Capt. Dale.

Capt. DALE explained by a plan the present state of the workings, and was of opinion they would cut the lode in the south in about 6 feet. The north cross-cut he considered very near to five fathoms.

The CHAIRMAN said, although the reports were in different phraseology, they agreed exactly and precisely in what they were doing.

Mr. CHARLES believed there was a very favourable change in the ground, and they were likely to eat the lode very shortly.

Capt. DALE did not know better strata for copper anywhere.

A SHAREHOLDER said it was impossible to say the exact distance they had to go to get to the lode, but he should like to have heard whether the works were being carried on with energy, and it would have been more gratifying if that question had been inserted in the instructions to the gentlemen employed by the sub-committee.

Mr. SMITH believed that if they abandoned the deep workings of the Pembroke mine it would considerably reduce the expenditure; and, as they had such a quantity of ore in sight, there was a certainty of carrying on the other mine at a profit. He wished to know whether Capt. Dale had altered his views that, if that they did not succeed with the work in hand and find it unsatisfactory, they should stop Pembroke and work East Crinnis?

Capt. DALE said his opinion was unaltered; it was the same as some time ago. He differed with Captain Granville: there was a better lode in the 112, and he could not tell why they should not have it in the deeper levels. He (Capt. Dale) had seen it in the 112, although Capt. Granville had not seen it; and Capt. Webb, when he came up, said if they "knocked" the mine they might as well "knock" any one in Cornwall. If the western part of the mine were abandoned they could stop the engine on Pembroke. The present 80-in. engine at East Crinnis, with the aid of the water-wheel, would be ample to keep the water at this mine, and the Pembroke machinery would be at the disposal of the adventurers.

A SHAREHOLDER wished to know when the ventilation would be complete?

Capt. DALE replied in about two months.

The CHAIRMAN said, in his opinion, the course they had pursued, and were still pursuing, was the right one, and if that failed they would have the satisfaction of knowing that they had worked it in a business-like manner, and he should, therefore, move a resolution to that effect. He should have preferred that the question had been put to the agents, and it could be done now,—whether the mines were being worked in the most energetic and economical manner?

Dr. McCRAE considered the sub-committee paid a very high compliment to their own agent, Capt. Dale, in not putting the question, as he believed all were of opinion that the work was carried on with both energy and economy.

Mr. CHARLES said he was in the habit of visiting the county, and was thoroughly satisfied by personal observation as to the manner the works were carried on, which was the reason he did not put the question. If he had had any doubt he should have put it, as he had frequently done in other cases.

The CHAIRMAN then proposed the following resolution:—"That it is the opinion of this meeting that the operations pursued by the agents of the mine are those most advantageous to the interests of the adventurers, and should be continued with the utmost vigour."—Dr. McCRAE seconded the resolution, which was carried unanimously.

Dr. McCRAE proposed a vote of thanks to the Chairman for the great pains he had taken, and gentlemanly manner in which he had conducted the affairs of the meeting.—Mr. ELLIOTT seconded the resolution, which was carried with applause.

The CHAIRMAN having acknowledged the compliment, the proceeding terminated.

WHEAL EDWARD MINING COMPANY.

A meeting of adventurers was held at the offices of the company, Austinfriars, on Tuesday, Mr. J. E. MATTHEW in the chair.

Mr. KING read the notice convening the meeting, and the minutes of the last, which were confirmed.

A statement of accounts, ending October, was submitted, from which the subjoined is condensed:—

Balance last audit	£ 198 17 5
Copper ore sold	3341 19 10
Wheat Arthur Company	559 2 9 = £4173 0 0
Mine cost, Aug., Sept., and Oct.	£2513 2 5
Discounts	5 12 2 = 2518 14 7
Balance in favour of adventurers	£1654 5 5

The CHAIRMAN said, before passing the accounts, they had better hear the report of the committee of management, as he believed it would give them full information as to their financial position.

Mr. KING then read the following report of the committee of management:—

The committee deem it necessary at this meeting to place before the adventurers a short report of the present financial position of the mine, and one or two minor points in connection with the past three months' operations. In the estimate given at the last quarterly meeting, the anticipated balance for the quarter was 25000., but by the balance-sheet now presented the amount is 16541., showing a difference of nearly 1000. Your committee have much pleasure in stating this great deficiency does not arise from any falling off in the return of the mine. You will be glad to hear the agent's report that the prospects are exceedingly good, and at no time presented such indications of a good and lasting mine as at the present. The commercial disasters which have occurred during the past quarter have been the cause of a great fall in the standard of copper, and has made a difference in the amount realised on the 549 tons sold during the quarter of about 6000. This will account for one portion of the deficiency. At the meeting in September, the subject of the encroachment by the Wheal Arthur Company was a matter of dispute, since which time, the committee are glad to say, the question has been settled. Mr. Henderson was appointed on behalf of the company, and Capt. Pope on behalf of the Wheal Arthur Company, with instructions for them to appoint an umpire to decide, in the event of their not agreeing. They appointed Capt. Josiah Thomas, to whom they were obliged to leave the question, and the committee have to state that his award was favourable to this company. The quantity of ore ground taken by Wheal Arthur Company was shown to be 67 1/2 fms., for which, on deducting returning charges, the amount awarded was 5892. 24. 9d. In the estimate was charged 9641. as the value of the ground taken, without deductions, making a difference of 3751. This amount, and the loss on the sales of ore, will account for the difference in the estimated balance and the balance now in hand. It is a source of great pleasure for the committee to state, though they have sold during the quarter 549 tons of ore, realising 3341. 19. 10d., and making a profit on the quarter of 771., the reserves now may be estimated at 20,0000. The committee thinking it desirable that Capt. East should attend the meeting, he is here to give any explanation that may be desired. The most important point for this meeting to determine is the future operations. Your committee, seeing the great and sudden fall in the standard, and the loss sustained by the company, at once put themselves in communication with the agent as to the advisability of not selling or raising ore under a certain produce, and the policy of suspending those operations which would not interfere with the pushing forward with the utmost vigour of the principal points of the mine. The views of Capt. East perfectly agreeing with those of the committee, instructions were given to that effect, which will account for only 98 tons being sampled and sold for Nov. It now remains for the adventurers to consider this important point. Finally, taking these matters into consideration, your committee do not think it sound policy at this meeting to recommend a dividend, but feel it would be to the interest of all to carry the amount over until the March meeting, when they trust the adventurers will be able to declare a good dividend, with the prospect of an increasing one quarterly.

The CHAIRMAN said he was now ready to answer any questions, either upon the report or accounts.

Mr. POWELL (Powell and Cooke) said, after such an able, clear, and lucid statement, he really could not perceive that it was necessary to ask any questions.

Mr. LEELAN wished to know whether all the costs were charged up to the time of making out the accounts?

Capt. East replied they were to the end of Oct.; and, in answer to further questions by Mr. LEELAN, said they had about 70 tons dressed and undressed, and he considered the next sampling would be about 100 tons, which would give a produce of between 7 and 8 per cent. They had also 70 tons of a lower quality, which he did not think it wise to put in at the present standard.

Mr. POWELL proposed, and Mr. PETER WATSON seconded, a resolution that the financial statement, with the committee's report, be received and adopted.—Carried unanimously.

Mr. KING then read the following report of Capt. East:—

Dec. 19.—North Lode: Since last general meeting the 71 has been driven 8 fms. 2 ft., making total distance from shaft 18 fms. 2 ft. The lode has been cut through in different places, and some good quality ore has been broken; it varies in size from 2 to 5 ft. wide, and is at present 4 to 5 feet wide in the end, carrying a little ore, but not sufficient to value. We shall shortly intersect a cross course, when a change for the better may be expected. Nos. 8 and 9 winzes have been sunk about 6 fms. each from below the 62 east to the 71, at which point we have driven from winze to winze, and made a communication. The distance between the two winzes is about 18 fms. We have also driven the 71, west of No. 8, towards No. 7, 8 fms. 1 ft., making the total distance of 26 fms. 1 ft., and opened 208 fms. of ore ground. We have attached a run of rods to the engine, and put a 5 in. lift of pumps in No. 7 winze, which is now down to a sufficient depth for driving the 71 to meet the driving east of shaft, and also west of No. 8. There are about 25 fms. more to drive to complete the opening up of the 71 from shaft to boundary, which

I calculate will occupy about six weeks from this date. No. 7 winze is now about the deepest point in operation on this lode, and the lode assumes a very promising appearance, being from 3 1/2 to 4 ft. wide, and worth from 12d. to 18d. per fm.; here I should remark that nearly all the ground as yet opened above the 71, east from shaft to boundary, will come away at profit. The 62 has been driven west on the course of the lode about 6 fms. 2 ft.; the lode in the end is from 4 to 5 feet wide, yielding some very good ore, worth altogether from 10d. to 12d. per fm. The 52 west has been driven about 8 fathoms, lodes varying in size from 1 to 3 feet wide, and in places has yielded a little copper ore, but of no great importance. This end is driven 48 fms. from shaft, and is suspended for the time. We have commenced sinking a new winze about 10 fms. behind the end, for the purpose of ventilating the 62, and which will also enable us to form some opinion of the ore ground west of shaft. The 41 west is driven 60 fathoms. The lode in the end is about 5 ft. wide, principally capel. The ground is easy for driving, and very favourable for copper ore, but as it is driven many fathoms in advance of the deeper levels, I consider it best to suspend it for a while. There are five pitches working on this lode, at an average tribute of 7s. 4d. in 12, and the men are earning fair wages.—South Lode: The 61 is driven west of shaft 8 fms., the first 5 fms. of which was a good course of ore, at which point the lode becomes in an unsettled state, and is at present divided by a horse of killas about 5 ft. wide, and in which the end is now being driven. The north part of the lode is about 1 1/2 foot wide, and the south part about 9 in.; both parts are yielding stones of ore, and I have no doubt, when the lode is seen to the western point of 4 fathoms, the first 3 fathoms of which was driven through a very good lode, and is now worth in the end 2 tons of ore per fm. The driving at this point will be resumed as soon as convenient. The engine-shaft is down about 2 fms. below this level (the 61), and is in full course of sinking by 20 men. During the week we have taken down some of the lode, about 2 1/2 ft. in depth, and for the length of the shaft (12 fms.) it turned out about 10 tons of ore, which is after the rate of rather more than 20 tons per fm. The lode is fully 8 ft. wide, and possesses every feature of success. Since the improvement took place in this lode, in August last, we have sold 59 tons 3 cwt. 2 qrs. of copper ore, which realised 6800., and which is the produce of about 16 fms. of ground. The total returns of the mine for the quarter ending October is 548 tons 20 cwt. 2 qrs. of copper ore, realising 33841. 19. 10d., and but for the drop in the standard it would have been several hundreds of pounds more. I have curtailed the working cost of the mine as much as possible, consistent with the efficient working of all the important points, and would suggest that the returns for the ensuing quarter should be subject to the price to be obtained for the ore. The number of hands employed at present is 55 men on turnwork, 24 on tribute, 10 trammimg and filling, and 55 persons at surface, including the dressing department, making the total number of hands employed 144. The mine and the machinery are in good working order, and at no former period has the mine presented a better appearance than at present.—P.S. I have carefully gone into the reserves of ore, and estimate them, from the present depth of the mine, at about 20,0000.

Mr. LEELAN said the reports presented every feature of success, and that they were in most prosperous condition.

Capt. East said, in reply to a question from a shareholder, that in consequence of the reduction of the standard they had lowered the wages as much as possible, and the men were now paid from 5s. to 10s. per month less. All the agents in the district had met and done the best they could, having regard to their duty between master and man. Capt. East explained, by a section, that they met with a horse of killas on the south lode, which had divided it; but it was now taking a turn, as if the lode were coming together again; it was about 9 fms. from the cross-course. The lode in the bottom of the shaft was worth 20 tons per fm. of good ore.

Mr. LEELAN said he had been underground, and could bear out what was said by Capt. East, the stones produced were broken from the bottom of the shaft.

Mr. LEELAN asked, if the standard went up to the same price as at the last meeting would the returns be as then estimated—13000. per month?

Capt. East replied that if such was the case there would be no difficulty in keeping up the estimate then made.

Mr. MUNDAY wished to know at the present standard, and taking into consideration the reduction of cost, whether they were working at a loss?

Capt. East replied that they were not working at a loss, and at the same time were opening all the important points of the mine. If the standard did rise they would be in the position he represented at the last meeting. By working the mine in the manner they were now doing they were increasing the reserves.

The resolution adopting the agent's report was then unanimously passed.

The CHAIRMAN said an application was made by Mr. Watson, the purser, for an increase of salary; but the committee considered it inexpedient to take it into consideration.—After some further discussion, it was agreed that the application should stand over to the next meeting.

The Chairman, Messrs. Metherell, Munday, and Rawlings were re-elected the committee of management, with the addition of Mr. Halford, in the place of Mr. Hallett.

Mr. VIVIAN remarked that the committee of management held 132 shares.

Votes of thanks to the committee for past services, to Capt. East, and the Chairman, terminated the proceedings.

GREAT WHEAL BUSY UNITED MINING COMPANY.

A special general meeting of the adventurers was held at the offices of the company, Austinfriars, on Monday, Mr. NICHOLAS HARVEY in the chair.

Mr. KING (the secretary) read the notice convening the meeting, and the minutes of the last, which were confirmed.

A statement of accounts was exhibited, from which the subjoined is condensed:—

Balance last audit	£ 477 0 1
Mine costs and merchants' bills, August	219 9 5
" September	327 12 7
" October	2023 1 4
Lord's dues	107 6 = £8004 9 11
Call of 10s.	£3000 0 0
Tin ore sold	1234 5 10
Copper ore sold	1825 10 5
Mundie	15 0 0
Discount	14 8 7 = 5590 4 10
Balance against adventurers	£2414 5 1

Mr. KING, in answer to a question, stated that the large balance against the adventurers upon the present occasion arose through some of the accounts being kept back, but now everything was fully charged up.

Mr. RAWLINGS explained that the ore sold was from the upper levels; none had been drawn from below the 60.

Mr. KING then read the following report:—

Dec. 21.—The water is now down 95 fms. below the deep adit in Harvey's engine-shaft; the 93 has been dry for some weeks past; the engine drained 13 fms. the last week it was pumping 18 hours will now finish the remainder of the drainage, whenever we are ready for it. During the past three months we have cleared and secured Fenniger's shaft 16 fms., now secured to the 60, its present bottom, cleared and secured Offord's shaft 10 fms., now secured to the 60; cleared and secured Fielding's shaft 20 fms

"THE BOGHEAD MINERAL."

CHARACTERISTICS OF COAL, AND DISTINCTION BETWEEN IT AND BITUMINOUS SHALE, &c.

The question as to the nature of the Boghead Mineral has recently become a disputed point between two gas companies in Frankfort, and has been referred to Professor Göppert, of Breslau, for his opinion. He commences his report by remarking that the production of coal seems to have resulted from the deposition of large masses of organic substance, chiefly remains of plants, over surfaces of greater or less extent, and upon previous deposits of sand, clay, or mud, which, in consequence of the pressure and decrease of moisture, hardened gradually, and now appear as sandstone or clay-slate. Coal beds generally occur as regular strata, of considerable extent and uniform thickness. They are sometimes quite horizontal or muller-shaped, which shows that they were deposited either upon the bottom of the sea, or upon a slightly inclined and even coast, or most frequently in closed basins. This view agrees with the opinion, now generally received, that during and after the deposition of the rocks comprised in the transition series the continent of Europe was submerged beneath an immense ocean studded with islands. But since the number of marine remains found in the coal formation is comparatively small, and since coal itself has originated almost entirely from land plants, it may be assumed that the sea had but a transitory share in the production of coal beds. There are no grounds for supposing that the material from which coal originated was transported by the sea from any considerable distance to the place where it is now situated. All observed facts indicate, on the contrary, the prevalence of the greatest tranquillity during the actual production of coal. It is probable that the vegetation of that period, consisting of araucaria, lycopodium, ferns, equisetaceae, sigillaria, stigmaria, &c., in the luxuriant development peculiar to tropical climates, covered large extents of low plains near the sea coasts. Alterations of level of the surface produced overflow of the sea; the submerged vegetation being in course of time covered with fine sand and clay. By such repeated alternate elevations and depressions, with intervals during which the newly-exposed surface became covered again with fresh vegetation, the several coal beds comprised in a coal basin were produced one above another, with layers of sandstone or shale between them.

When the layers of coal acquired a considerable degree of solidity before the deposition of the sand or clay, and when this took place gradually, the coal and other layers would be sharply separated; but when, on the contrary, the submerged remains of plants were prevented by any cause from forming a coherent layer, the particles of organic substance would be mixed with the mineral substances in the act of deposition, giving rise to the production of layers of shale, highly impregnated with carbonaceous substance, and known by the names of coal shale, bituminous shale, &c. The more or less dark colour of these layers depends upon the amount of organic substance. Besides the difference indicated by chemical analysis between the amount of mineral substance in these shales and in true coal, they are also distinguished by shale giving a brown streak upon paper, while coal gives a black streak. This difference in the colour of the streak depends upon a variation in the state of preservation of the organic substance. In shale it appears, when examined by aid of the microscope, brown; and hence, in a less advanced stage of decay than in coal, where it appears black. In this brown organic mass may be recognised cells of the plants from which it originated. Ordinary coal or carbon coal, by aid of the microscope, appears almost entirely opaque, with only a few brown transparent specks, where it is but barely possible to recognise cells filled with yellowish-brown substance. The case is different with the so-called mineral charcoal, mixed with almost every true coal; this, when carefully split, presents cells and reticular vessels in various alternations; the former belong to conifers, the latter to calamites.

Considering well this view of the origin of coal, and of shale with various amounts of organic substance, as well as the probability that the different plants from which coal has been produced contained different amounts of mineral substance, it is not remarkable that there should be such a gradual transition from coal to shale, and such marked differences in the relative amounts of organic and mineral substance, not only in different coal fields, but also in individual layers of coal. The amount of ash for true coal rarely exceeds 5 or 10 per cent. With a larger amount of mineral substance the character of producing a black streak disappears.

Upon these grounds Professor Göppert pronounces the Boghead mineral to be a bituminous shale; for since its occurrence, and the plant-remains associated with it show that it belongs to the coal formation, the principles above laid down as to the production of coal and shale, as well as the sole true distinction between the two, are perfectly applicable for deciding which class the Boghead mineral should be referred to.

The relation between this mineral, with its brown streak and brown plant-remains, and true coal, the mass of which is decidedly black throughout, is the same as that between charbon rose and black wood charcoal. The shales are products of imperfect carbonisation in the wet way, just as the charbon rose is the product of imperfect carbonisation in the dry way; both are richer in hydrogen than true coal or charcoal, and, consequently, they are better adapted for the production of combustible gas than the latter.

—Zeitsch. für das Berg-Hütten und Salinenwesen im preuss. Vol. 1. 1857.

INFLUENCE OF THE COMPOSITION OF THE BLAST-FURNACE CINDER UPON THE STRENGTH OF HOT-BLAST IRON.—MM. Janoyer and Gauthier have found that the strength of iron smelted with a hot-blast depends very much upon the amount of limestone used in the operation. Pig-iron obtained with a charge yielding a cinder, in which the proportion of lime and alumina to silica was as 7:10, had little strength, but broke readily, and analysis showed that it contained 3 per cent. of silicon. The large amount of silicon in pig-iron smelted with hot-blast is probably due to the easier reduction of silica at the high temperature which prevails in the fusion zone of hot-blast furnaces. Hence MM. Janoyer and Gauthier were led to the opinion that, by increasing the amount of lime in the charge, so as to obtain a cinder containing a larger amount of lime, this reduction of silica might be prevented. When the proportion of bases to silica was as 8:10, and, at the same time, employing a blast at the highest attainable temperature, the iron produced had much greater strength, and contained only 1.8 per cent. silicon. When the proportion of bases to silica in the cinder was as 20:19, the iron contained only an unappreciable trace of silicon, and the strength was increased in the proportion of 65 to 45. It would appear, therefore, that the inferior quality of pig-iron smelted with hot-blast is not to be ascribed solely to the higher temperature which prevails in the furnace, but is owing rather to the ingredients of the charge not being suitably proportioned for preventing the reduction of silica, by having a sufficient amount of lime present. When the maximum amount of lime was used, the consumption of fuel was on the average increased to the extent of 6 per cent.—*Bulletin de la Soc. de l'Industrie Minérale.*

AUSTRALIA.—Much misapprehension exists in mercantile circles as to the due arrival of the future mails from Australia, but there seems no real cause for this alarm. It is true that the breaking down of the *Emu* will prevent the departure of the January mail from these colonies at its proper time, but those of November and December will come forward in the regular manner, and the former will be due, by telegraph, *via* Malta, on Dec. 29, and the delivery of the bags in London, *via* Marseilles, on the following Saturday (Jan. 2); but as the Post-office authorities have dispatched a staff of officials to Alexandria to meet the homeward mails, so to "work off" the letters *en route*, which will, it is expected, expedite the delivery of them by many hours, and as the coming Australian packet will be the first to which the new regulations will be applied, it is possible that the letters and papers will be distributed in the metropolis on Friday afternoon. Hitherto, the delay has arisen between the Australian ports and Suez, and not between Alexandria and the home ports, so that there was no blame to attach to the Post-office authorities; and if the Admiralty would follow the initiative of "working in" the steamers to Suez in the spirit which the Post-office has resolved to do in "working off" the ports, there would be no ground of apprehension, either as to the present time, or the due delivery of the correspondence.

gas and water for the metropolis.—Mr. Samuel Hughes, F.G.S., published a brief treatise in reference to the gas and water companies, complaining against the present system of amalgamation going on, by which the right of choice entirely taken from the consumers, each company being apportioned a certain district, and the other companies refusing to compete therein. Mr. Hughes states that means by which the public may meet the encroachment of the gas companies are the local boards should combine to erect gas-works of their own on the outskirts of the metropolis, or that the boards should introduce a bill into Parliament to call all the London gas companies under the immediate operation of the Gas Works Act, and to give power of arbitration to the Board of Trade, or some similar body, in case of dispute between the local boards and the gas companies. The writer is well worthy the perusal of every person in the metropolis using either gas or water.

SALES OF COPPER ORES.

COPPER ORE SOLD AT CORNWALL TICKETINGS, FOR THE QUARTER ENDING 24TH DECEMBER, 1857.

Mines,	Sales.	Tons.	Amount.
Devon Great Consols	3	6128	£31,441 5 6
South Caradon	3	1192	11,030 2 0
United Mines	5	2438	10,159 7 6
West Seton	3	1390	9,551 19 0
West Bassett	3	1661	9,444 7 6
Wheat Bassett	3	1259	9,104 14 6
Par Consols.	3	978	8,226 11 0
Wheat Buller	3	1689	7,494 5 0
Fowey Consols	3	1140	7,460 8 5
South Frances	2	964	7,025 0 6
West Caradon	3	987	6,397 2 6
Alfred Consols	1	1031	6,162 16 6
North Bassett	1	1031	6,100 19 6
Great South Tolgas	1	910	6,051 19 6
Phoenix	1	1272	5,838 1 0
Wheat Friendship	1	389	5,346 19 0
Wheat Clifford	1	756	4,318 11 0
Tincroft	1	726	3,641 4 6
Holmbush	1	371	3,405 1 6
Great Alfred	1	691	3,336 10 0
Bedford United	1	626	3,326 17 0
East Pool	1	715	3,326 12 0
South Crinnis	1	561	3,306 6 6
North Roskar	1	498	3,297 17 6
Wheat Seton	1	601	3,151 18 6
Carra Brae	1	835	2,830 17 0
Wheat Edward	1	461	2,727 2 6
West Damsel	1	530	2,676 15 0
North Robert	1	419	2,556 15 0
South Tolgas	1	291	2,334 19 6
Botallack	1	228	2,290 10 6
Devon and Cornwall	2	426	2,175 2 0
Collombe	1	425	2,166 2 0
Grampier and St. Asby	2	101	2,025 14 6
Sorridge Consols	2	329	2,019 9 6
Condurow	2	379	2,014 2 0
Marke Valley	1	594	1,877 14 6
Rosewarne	1	246	1,735 5 6
Craddock Moor	1	185	1,577 4 6
West Fowey	1	174	1,560 12 6
St. Day United	1	203	1,519 12 0
Kelly Bray	1	342	1,516 10 6
South Crofty	2	277	1,515 8 6
North Pool	2	289	1,451 7 6
Treascan	2	527	1,443 12 6
Duke of Cornwall	3	500	1,435 6 6
Wheat Emma	1	217	1,420 12 0
Great Wheal Busy United	1	506	1,328 11 6
Levant	2	327	1,261 14 0
Hington Down	1	230	1,165 17 0
Wheat Anna	1	224	1,044 9 0
Halsmaning	1	104	991 2 0
East Alfred Consols	2	109	955 6 6
Wheat Charlotte	1	148	943 6 6
Gonanema	1	151	933 3 0
Wheat Tehidy	1	119	923 10 6
Tolvaden	1	147	904 8 0
Great Crinnis	1	193	892 15 6
Wheat Treborth	2	124	887 3 0
Carvanall	2	95	846 7 0
South Crevener	3	239	816 15 0
Camborne Vein	2	144	796 16 0
Copper Hill	1	133	775 18 6
Dolcoath	2	200	765 7 6
East Tolgas	2	123	715 11 6
Calstock Consols	1	92	692 8 6
East Rosewarne	2	88	674 19 0
Pembroke and East Crinnis	1	144	597 19 0
West Alfred	1	95	582 9 0
West Crinnis	1	120	536 12 6
Wheat Margery	1	135	528 11 6
Wheat Arthur	2	220	497 4 6
North Crofty	1	107	489 3 0
Trevoole	1	87	470 14 6
Boiling Well	1	120	455 0 0
West Stray Park	1	70	428 8 0
East Russell	1	37	421 10 6
Wheat Ellen	1	116	419 19 8
Clyjeh and Wentworth	1	80	412 10 6
South Ellen	1	90	410 6 6
Great Sheba	2	207	407 7 0
Wheat Unity	1	52	365 6 0
Carrack-Dews	1	72	358 10 0
Creegbrawse	2	84	353 17 0
East Bassett	1	39	331 9 0
Tavy Consols	1	84	319 10 0
Devon Buller	1	60	303 11 0
Treloweth	1	39	299 9 0
Old Bassett	1	110	291 10 0
Camborne Consols	2	43	229 5 0
Wheat Kitty	1	20	219 4 6
South Bedford	1	92	202 8 0
North Busy	1	31	188 6 6
Wheat Russell	1	88	171 7 0
West Providence	1	30	168 15 0
Wheat Agar	1	32	163 2 0
West Par	2	137	162 2 6
Wheat Comford	1	37	149 9 0
Lady Bertha	1	27	142 18 0
North Frances	1	17	121 12 0
Wheat Guskus	2	20	121 0 0
Antron Consols	1	54	115 17 6
Perran St. George	1	39	115 13 0
Wheat Trefus	2	18	107 15 6
Eny's Ore	1	29	107 6 0
Hawkmoor	1	15	104 2 0
Wheat Harriett	1	46	101 4 0
Gawton	1	14	95 4 0
Wheat Uny	1	23	90 17 0
St. Asby and Grylls	1	21	85 18 6
Penscore Consols	1	20	85 10 0
Wheat Zion	1	16	83 16 0
Queen of Dart	1	30	83 5 0
West Frances	1	6	75 13 0
East George	1	17	70 2 6
Wheat Cupid	1	11	69 17 0
Stray Park	2	41	65 14 0
Wheat Lewis	1	6	53 11 0
West Jane	1	14	44 9 0
Penberthy Crofts	1	7	42 14 0
West Treasury	1	23	39 13 6
Wheat Crebior	1	16	

GOVERNMENT SCHOOL OF MINES.

The lecture by Mr. W. WASHINGTON SMYTH, was a continuation of the preceding one, on "Levels." The levels, or galleries, to which he had previously alluded, were some of the most important, and he had pointed out the various modes in which these had been driven. In prosecuting a level, care should be taken that the dimensions should not be too large for the purpose intended; they should see that the ascent was likewise not too great, and one desideratum which ought especially to be looked to was that the gallery should be as straight as possible, as a deviation might not only be productive of great expense, but at the same time of considerable inconvenience. It was always advisable that no more timber should be used than necessary, as the destruction of the timber by decomposition has a prejudicial effect on the atmosphere. In some metalliferous mines the lode was so large that the level could not be carried through to its full extent, and much depended upon the mode in which the level was carried out. The difference of supporting the roof by timber, as well as by staves, was then described, and illustrated by diagrams, as well as the different methods employed in studding. Where the lode is larger than the level, several views must be taken of the subject, and no practical step should be undertaken without due consideration. Allusion was then made to a loose lode, and the manner under several circumstances of driving a level through it dilated upon, and the mode of timbering in order to secure it shown. The comparative hardness of the country and the lode would have to be considered, and the dip and form of it investigated. The Phoenix Mines, which had for a considerable period been working at a loss, were now, by a judicious system of operations, brought into a paying state. Often it was not desirable to drive through the hard granite, but to carry on the level by the side of the lode, and at intervals put in cross-cuts; by this means they could prove it, and where productive would obtain the ore at a cheaper rate by stopping. This mode of operation was carried out in some districts of the Harts, near Clausthal, with great advantage. In some of these large levels, which were excavated to a great depth and height, falls of rock were often occurring; and at Felsobanya, where the action of fire was used for disintegration of the rock, there were sometimes masses of several tons breaking away; so great were these, that occasionally they would destroy two or three levels at once by their superincumbent weight, and every man who is working there feels his life in jeopardy. Arches of ground are left in order to secure the men, and to prevent the fall, but even then the lives of the miners are in considerable risk, and there is a great chance of the men being buried. Sometimes the levels are driven, not only out of the lode, but from the walls of the lode. The Wicklow Mines were then described, and the foakany joint pointed out; great precautions to prevent accidents appear to be taken there. At the iron mine at Restormel, in Cornwall, called the Royal Mine, in consequence of her present Majesty having visited it, the lode was very large, and from the level every 4 or 5 fms. cross-cuts are driven, each of them being separate pitches. Levels are driven curvilinear in some instances, and in others rectilinear. A diagram was shown of the different methods of driving these in South Wales and the North of England. The straight in general were better for transport and ventilation, and a level driven upon this principle added greatly to its security. Some of them were exploratory, and others merely for working the minerals. It was always requisite, if possible, that the line of the level should be accurately taken; a deviation might easily arise, and an instance had lately occurred where, in working a level in Wales, the men had nearly come round to the ground from whence they had started. From time to time the use of the dial was of great importance, in order to ascertain all the bearings of the levels. The men in general, when they wish to ascertain if they are going in a straight direction, suspend two plumbets in the level; a candle is then held at the end, and this is put up until it comes in a direct line. Cross-cuts are of great importance; some mines have been abandoned owing to not working these, while others have been by the same means revived. Many adventurers, who are merely speculators, only taking an interest in a mine for the purpose of share jobbing, underrate the importance of cross-cuts, because they have to pass through dead work, which in many cases is an absolute necessity for the prosecution and preservation of the mine. In stratified deposits the lode is changeable, large in some instances, and in other cases small; sometimes it is entirely indiscernible, and many skilful miners will complain that the lode has been lost.

The lecturer then described the appearance of a lode when it became intermixed with the country. Sometimes the lode would branch off into strings, and the miner be left entirely without a lode. Dialling was of great importance in discovering a lode which was missing; the miner returned back to the spot where it had branched off. In general, the lode was very often some distance open before it became stringy. Great attention was always required to be paid in mining when a lode in the level was thrown out of its direction a few feet; its dip and angle ought to be studied, and the same observations may be applied when speaking of sinking. Because the lode was occasionally lost, adventurers ought never to despair, but take heart, as it probably might be within a few feet of them.

Mr. Warington Smyth gave several instances where mines, after a considerable expenditure, had been abandoned by one company as losing concerns, then taken up by another set of adventurers, who, perhaps, after driving merely a few fathoms, either by a cross-cut or other means, came on a course of ore. Such cases were not uncommon, and showed the necessity of practice, perseverance, and observation in bringing mining undertakings to a successful issue.

The lecture by Dr. PRACY was on "Lead Smelting." At Bleiberg, in Carinthia, the furnace had an inclined plane, and the product is poured from the furnace (which is a reverberatory one) as it is reduced, so that in this particular it differs greatly from the English method. The processes here are three—1. The oxidation.—2. The reduction.—3. A peculiar process—that is, the reduction of the ore which has been oxidised, by the help of charcoal. The single bed is used, and sometimes double; when there are two, these are placed at right angles. A diagram was shown illustrating this. The length of the bed is 3-42 French metres long by 1-42 broad, and the length of the grate 1-58; these proportions are not always constant. The slope is about 10 degrees. The bed is formed from below, upwards; it is first made of masonry, afterwards slag, and then a debris of slag; these are melted until they become soft. The middle of the bed is hollowed, 0-16 m. depth. The rabbles are made of iron, with a triangular plate at the end. When the furnace is at work, it is allowed to go to a cherry-red heat. Great care must be here taken to prevent the clotting; the furnace is, therefore, rabbled as often as the smelter thinks it necessary, to obviate this difficulty. Occasionally, after about 1½ hours roasting, drops of lead will begin to appear; this, however, should, if possible, be avoided. When this occurs, the fire is either damped with green wood, or set aside. This process generally takes about three hours.

In the second process, the temperature of the furnace is raised, and in about three hours the lead begins to melt. It is then broken up and rabbled over the furnace, and this is continued until the lead ceases to trickle and sulphurous acid is evolved. In the third process, technically called by the Germans *das Pressen*, in three or four hours the heat is much increased. Ignited and carbonaceous wood is withdrawn from the furnace, and thrown upon the bed; this, which has been previously oxidised, has to be reduced by the action of carbonaceous matter. The ore is set up to the highest part of the furnace after about half an hour, when the lead begins to trickle, it is again rabbled, and this operation is repeated at the last part of the charge. The furnace is kept up to nearly a white heat. From motives of economy, this process is only repeated at every alternate charge. The lead, which is poured into the receiving pots, is afterwards melted, and made into pigs.

The loss of lead in these operations by the dry assay, which never gives the correct quantity, may be estimated at 4 per cent., and this may be reckoned properly at from 8 to 10 per cent. The actual cost of smelting may be thus calculated:—One metrical quintal of ore, equal to 100 kilos, can be smelted at 3 fms., and this result would give in round numbers 30 fms., or 25 per ton. A metrical quintal of lead will cost 4-52 fms. Much depends upon the heat of the furnace. The difference of the ore must be considered, as far as regards the foreign matter they contain, as well as their fusibility; those that are more fusible generally require a great heat. Very elaborate descriptions of lead smelting would be found in "Karsten's Metallurgie," "Annals of Mines," and other works.

The lecturer then gave a description of the double bedded furnace, as used at Bleiberg. There were two inclined beds, the one above the other, at right angles; the flame passes partly over the upper bed, and through a chimney. If it be required, the communication can be stopped. This furnace has a double advantage, the roasting and reduction processes being enabled to be accomplished at one and the same time. There is an arrangement for the air, likewise a manner of adjusting it.

The bed is first made of an iron plate, then covered with an argillaceous schist, and lastly a layer of slag. The rabbles are either made of wrought iron or grey pig, the latter being preferred, on account of their being cheaper. The charge to be roasted can be placed in the upper bed, all communication being closed subsequently; this is reduced with the ore on the lower bed. This is drawn out, and not dropped, as he had mentioned in some of the processes of copper smelting where this method was practised. The loss by roasting was then alluded to. Two parts of the process were smelted on the lower bed. The third, which is rich in oxygen, is subjected to a reduction effected by ignited embers. The third process yields from one-third to one-fifth of the total quantity of lead. One metrical quintal of lead in the double furnace consumes 0-437 cubic metres of fuel, while in a single furnace 0-653 will be used, so that in this there is a saving of one-third. The poorer the lead the more expensive is the reduction.

There is a great difference in the yield by the assay and in the furnace. They could thus take these figures:—78 to 4, 76 to 5, and 74 to 6; and this could be estimated, that if the smelter receives 65 per cent. of ore he will only give 56 of metal.

This was not quite lost, as much was subsequently recovered, and there was a considerable saving in the double over the single furnace. He would now refer to the English mode of smelting in the reverberatory furnace; after the slag was skimmed off, a certain quantity of lime, if necessary, was thrown in, in order to bring the slag to a consistency.

At Tarnowitz, in Silesia, they reduced the lead by scrap and other sorts of iron.

Several patents some years since were taken out for reducing lead by iron in England.

It was astonishing that many persons would not investigate what had been done by others previously, but there were always men ready to seize like hawks, and endeavour to elaborate any idea, however crude, without enquiry, provided they thought it was novel. Several of these patents had caused great litigation. They might remember he had previously alluded to Bishop Watson's Essays, which were published in 1784; there the zincing of iron was mentioned as having been practised in France in 1742. At Tarnowitz, the ores were galena in dolomite, very poor in silver, accompanied with iron pyrites and brown ore. The ore and the schilch is smelted separately. An estimate had been made of the cost of smelting in the high and low furnaces. Coke and iron was used as the reducing agents. Subsequently coal had been used to advantage. A larger quantity of pig-iron was required when it was used in a granulated state than when broken into pieces when red-hot. Coke was found to produce a greater effect than charcoal, but the labour and iron were more expensive. The time requisite to smelt 100 centners of ore was 16 hours, and this required 45 to 50 cubic feet of coal. The products were from 67-6 to 69-3 of lead, 20 to 25 of matte, and 30 to 35 of slag. It was calculated the loss of lead by assaying was 4 per cent.; analyses had given 7 or 8 per cent.; the loss, however, might be reckoned at about 12 per cent. The proportion of silver varied from 2 to 2½ loths, a loth being half an ounce English.

The smelting of the schilch was thus:—100 parts of schilch, 32 of unroasted matte, 12 to 15 from the hearth, 8 to 10 of pig-iron, 24 of iron slag, and 100 to 120 of clean lead ore. The roughs generally give 40 per cent., and the small 36 per cent., but the matte obtained is regarded as worthless, and thrown away as of no use. On an average, to smelt 100 centners of lead 40 hours are required. The expenses are greater in the higher than the lower furnace, but this is compensated by the increased produce of the lead. The product of the slag in both furnaces gave, by dry assay, about 15 per cent. Several interesting deductions were given, and it was elicited by these that for a given quantity of weight the high furnace would produce 3 per cent. more. The furnace for reducing the slags in this country was called the Spanish furnace; it

was circular, fastened with iron hoops, and had three tongues. A description was given of this, and the further consideration of the reduction process deferred until a subsequent lecture.

Mining Correspondence.

BRITISH MINES.

ABBEY CONSOLS.—J. Trewin, Dec. 21: The lode in the 10, east of the engine-shaft, is much the same as for some time past, producing 5 fms. of lead per fm., and has a good looking appearance. The adit end, west of the said shaft, is suspended, and the men are put to stop the back of the same level; the lode at this point is worth from 5 to 6 fms. of lead ore per fathom. The lode in the adit end, west of the eastern shaft, is much the same as stated in my last report, worth 2 fms. of lead ore per fm., and has the same flattening appearance. The lode in the adit end, east of the eastern shaft, is still composed of quartz, &c., producing spots of lead ore. Although this lode may be termed poor it is of a very promising character. There is no change to notice on the lode in the eastern shaft, lode still worth 9 fms. of lead ore per fm. The rise in back of the adit being poor it is for the time suspended. No. 1 stopes are worth from 10 to 12 fms. of lead ore per fm.; No. 2 stopes are worth about 7 fms. of lead ore per fm. The stopes east of the rise are worth 5 fms. of lead ore per fm.

ALFRED CONSOLS.—M. White, T. Trelease, T. Hosking, Dec. 23: The north lode in the 140, east and west of cross-cut, is about 6 in. wide, nearly all ore; this lode in the winze sinking under the said level will produce 1 ton of ore per fathom, and has a good looking appearance. The adit end, west of the said shaft, is suspended, and the men are put to stop the back of the same level; the lode at this point is worth from 5 to 6 fms. of lead ore per fathom. The lode in the 120, west of cross-cut, is worth from 8 to 10, per fathom. The main lode in the 120, east of Davey's engine-shaft, is worth quite 40, per fathom. The main lode in the 110, east of said shaft, is worth 25, per fathom. The north lode, east of said shaft, in this level, is worth 10, per fms. The main lode in the 110, west of No. 2 winze, is worth 50, per fms. The north lode in the winze sinking below the 100 is worth 12, per fms. The north lode in the 70, east of the flookan, is improving in size and appearance. All the other parts of the mine are just as for some time past.

ANGARRACK CONSOLS.—J. Barratt, Dec. 22: Since last report, we have discovered a bunch of Cox's engine-shaft, bearing east and west, 6 in. wide, composed of pebbles, quartz, and flookan, showing tin, with spots of yellow copper ore and mudi, underlying south about 4 ft. 6 in. in a fm.; it is not of value at present, but will in a little depth intersect Mellinwoeth lode, and the lodes discovered in Cold Harbour, which underlie north, at which point it may (if not before) become a valuable lode. Cox's engine-shaft is being prosecuted with all possible dispatch, and is near a communication with the adit. The adit end is in 16 fms. 1 ft. 9 in. from the junction of the caunter and Eaton's lodes—ground hard, and the air very foul. The masons have completed the building and roofing of the engine-house, and are now engaged in building store-rooms and account-house, and will commence as soon as the boiler is fixed to build the boiler-house. The engineers are engaged erecting the engine; the spring and side beams are placed; the bob (main beam) is in the house, and will be fixed in the wall to-morrow. The cylinder is also in the bed for being drawn in, and the heavy parts of the machinery will be in the engine-house this week.

BALNOON.—W. Hollow, Dec. 23: As we can have no permanent change of strata in the Woolo shaft, and the ground still continues very hard, we begin to think it very probable the shaft may be going down in a horse or channel of whetstone, and to prove this we have begun to drive north and south from the bottom of the shaft; there is a lode near us each way, and should the above turn out to be the fact, it will very likely be a good thing: driving by eight men. At the flat-rod shaft we are still driving the 15 west, and have also put four men to open south on a small branch in that level, to prove it.

BALLYMONEEN.—W. Barkla, Dec. 19: Since we cut the sulphur in the 15 fm. cross-cut north we have opened east and west 4½ fathoms, which has produced good sulphur; but in the east driving there is a little change, by a poor piece of ground that came in between the sulphur, which has rather disordered it for the present—driven since last report, 9 fms.: total driven, 1 fm. 5 ft. In the 15 fm. level, driving west, we have still a good lode of sulphur—driven since last report, 4 ft.: total driven, 2 fms. 6 in. As the water has left us, I hope we shall make better progress in sinking the winze below the adit-level—sunk since last report, 4 ft.: total sunk, 7 fms. 3 ft.

BALLYVIRGIN.—D. Macdonald, R. Pellow, H. Kellaway, Dec. 17: The 15 fm. level, from the bottom of the shaft, has been driven west 11 ft. towards the lode; the ground is, on the whole, more regular, but still hard for driving. The end is showing a considerable increase of calcareous spar, and within the last two days the spar is carrying strings of lead ore. The cross-cut east from No. 1 stope has been suspended, until we bring in a stope from the bottom of the north level; this is done for the purpose of proving our levels good. No. 2 stope is worth 2 tons of lead, 15 fms. of copper, and 10 tons of mudi per fm.; we expect an improvement in this stope for lead as we go northwards. No. 3 stope is worth 3 tons of lead, 10 fms. of copper ore, and 6 tons of mudi per fm. The cross-cut east, to cut the newly discovered lode, has been driven 5 feet; the ground is hard for driving; strings of calcareous spar, containing stones of copper, have been met with in the bottom of the cross-cut; there is no increase of water. We have commenced putting large timber in the south level, to support the hanging wall of the lode; when this is done we shall begin to stope the back of the 10, south of the engine-shaft; we expect to find a larger proportion of copper ore in this part of the mine than is the north level. Since the date of last report we have put 3 tons of lead ore, 1 ton of first crop and 4 tons of second crop copper ore, and 30 tons of mudi to pile. We have spalled and cobbled about 4 tons of lead ore and 1½ ton of copper ore, and have put to grass about 50 tons of mudi and 4 tons of copper ore. We shall draw the lead ore from the northern stope to surface in a few days. The drawing of the stuff to grass has been set to four men, for two months, at 9s. per month, they paying their own costs; this includes all the stuff now broken in the mine.

BEDFORD CONSOLS.—J. Hodge, J. Mitchell, Dec. 23: In the adit end we have no change to notice of importance since our last report; we have taken down the lode in the south end, and find it to be about the same size as before stated, and producing good stones of copper ore; this is done for the purpose of proving our levels good. No. 2 stope is worth 2 tons of lead, 15 fms. of copper, and 10 tons of mudi per fm.; we expect an improvement in this stope for lead as we go northwards. No. 3 stope is worth 3 tons of lead, 10 fms. of copper ore, and 6 tons of mudi per fm. The cross-cut east, to cut the newly discovered lode, has been driven 5 feet; the ground is hard for driving; strings of calcareous spar, containing stones of copper, have been met with in the bottom of the cross-cut; there is no increase of water. We have commenced putting large timber in the south level, to support the hanging wall of the lode; when this is done we shall begin to stope the back of the 10, south of the engine-shaft; we expect to find a larger proportion of copper ore in this part of the mine than is the north level. Since the date of last report we have put 3 tons of lead ore, 1 ton of first crop and 4 tons of second crop copper ore, and 30 tons of mudi to pile. We have spalled and cobbled about 4 tons of lead ore and 1½ ton of copper ore, and have put to grass about 50 tons of mudi and 4 tons of copper ore. We shall draw the lead ore from the northern stope to surface in a few days. The drawing of the stuff to grass has been set to four men, for two months, at 9s. per month, they paying their own costs; this includes all the stuff now broken in the mine.

BODFORD CONSOLS.—J. Hodge, J. Mitchell, Dec. 23: In the adit end we have no change to notice of importance since our last report; we have taken down the lode in the south end, and find it to be about the same size as before stated, and producing good stones of copper ore; this is done for the purpose of proving our levels good. No. 2 stope is worth 2 tons of lead, 15 fms. of copper, and 10 tons of mudi per fm.; we expect an improvement in this stope for lead as we go northwards. No. 3 stope is worth 3 tons of lead, 10 fms. of copper ore, and 6 tons of mudi per fm. The cross-cut east, to cut the newly discovered lode, has been driven 5 feet; the ground is hard for driving; strings of calcareous spar, containing stones of copper, have been met with in the bottom of the cross-cut; there is no increase of water. We have commenced putting large timber in the south level, to support the hanging wall of the lode; when this is done we shall begin to stope the back of the 10, south of the engine-shaft; we expect to find a larger proportion of copper ore in this part of the mine than is the north level. Since the date of last report we have put 3 tons of lead ore, 1 ton of first crop and 4 tons of second crop copper ore, and 30 tons of mudi to pile. We have spalled and cobbled about 4 tons of lead ore and 1½ ton of copper ore, and have put to grass about 50 tons of mudi and 4 tons of copper ore. We shall draw the lead ore from the northern stope to surface in a few days. The drawing of the stuff to grass has been set to four men, for two months, at 9s. per month, they paying their own costs; this includes all the stuff now broken in the mine.

BODLICOTT.—F. Evans, Dec. 19: Evans's shaft has been sunk the last week 2 ft., the ground is rather more favourable for sinking; we have a part of the lode here, we have seen but a small portion of it as yet. The 10 west-driven the last week 2½ ft.: total driven, 34 fms. 2 ft. 3 in.; the part of the lode down is composed principally of spar, occasionally lead and sulphur; a large portion of the lode is standing.

BOILING WELL.—John Delbridge, Dec. 19: The sumpmen are engaged rising against King's shaft above the 60; the ground is favourable for rising. The ground in King's shaft, sinking below the 50, seems favourably, and looks more promising to yield ore than in the level driving about this point; in the 50, east of King's, the lode is small and poor. In the 40 east from the cross-cut, 13 fms. west of Austin's shaft, on the south lode, it is 4 to 5 feet wide, yielding some good lead, blonde, and copper ore. In the 40, east of Austin's, the lode is 1 foot wide, stones of copper ore; the country seems more kindly than of late to yield copper ore and less lead. In the 30, east of Austin's, the lode is from 6 to 8 inches wide, spots of copper ore. In the 20, west of Syrett's, the lode is 2½ ft. wide, opening in tributary ground, a very good looking lode; in the 20, east of Syrett's, the lode is 1 ft. wide; at present we have a good branch of lead in this level, still looking kindly for copper. We have the horse-whim of Fielding's shaft complete for drawing. We shall commence sinking below the 12, below the adit, early in the coming week; the lode in this shaft is 2½ ft. wide, yielding stones of lead and copper ore. At times in driving south, about 23 fms. west of Austin's, we have not met with any lode as yet. We shall try to sink Syrett's shaft in a few days.

BOWFORD.—F. Evans, Dec. 19: Evans's shaft has been sunk the last week 2 ft., the ground is rather more favourable for sinking; we have a part of the lode here, we have seen but a small portion of it as yet. The 10 west-driven the last week 2½ ft.: total driven, 34 fms. 2 ft. 3 in.; the part of the lode down is composed principally of spar, occasionally lead and sulphur; a large portion of the lode is standing.

BOILING WELL.—John Delbridge, Dec. 19: The sumpmen are engaged rising against King's shaft above the 60; the ground is favourable for rising. The ground in King's shaft, sinking below the 50, seems favourably, and looks more promising to yield ore than in the level driving about this point; in the 50, east of King's, the lode is small and poor

IMPROVEMENTS IN STEAM SHIP-BUILDING:
THE "ADRIATIC."

A delay of exactly one year has taken place in the time at which it was expected the *Adriatic* would be ready for sea. By way of explanation, it may be stated in brief that an effort was made to introduce a set of rotating plug valves (which worked well on a small engine), their object being to cut off the steam close to the cylinder, thereby preventing much waste of power. The adjustment of these was a very difficult process, and was finally abandoned; though the experience since obtained leads to the conviction that they will eventually be introduced with the greatest advantage. An effort was then made, by other parties, to adapt the "Sickles" cut-off, and arrange the connecting bars between the cam motion on the shaft and the cut-off on the oscillating cylinders. To accomplish this was a task of the greatest magnitude, and resulted in failure.

Among other important improvements introduced is the ventilation of the fire-rooms by a plan similar to that adopted in the coal mines of England, through an arrangement of doors and traps. Another invention of importance is Capt. Cavendish's tripod, which was tested on board by several naval gentlemen, and resulted, as on previous trials, in evident success.

Not less worthy of remark is Prof. Grant's Calcium light, which will be employed in protecting the ship from the danger of collision. Its intense penetrating power renders objects discernible in a dark night at a distance of from two to three miles. It will be elevated on the mast, so as to be above the eye of the pilot, and project a long pencil of light directly in the course of the ship.

The *Adriatic* being the largest steam-ship afloat, and perhaps without exception the finest specimen of naval architecture extant, the event of her completion will justify the publication of the following facts:—

The model of the *Adriatic* differs from all former practice, unless the U.S. steam-figate *Niagara* (also built by Mr. Steers) be made an exception. Both are modelled on substantially the same plan, with a studious adaptation of shape to the course of the water when cleft by the ship's prow, except that the *Niagara* is much sharper, but with less dead rise, preserving her stability amidships. The keel is curved throughout its entire length, but with little curvature towards the stern; while, at the other extremity, there is a rise of about 9 feet to the water-line, commencing 100 feet back. Some said to Mr. Steers that, in making his ship so sharp, she would go under; but he anticipated a result exactly the reverse, conceiving that the effect would be rather to throw her out of the water, so that the more rapid the speed the more she would rise, diminishing the displacement. Actual experience has confirmed his theory.

In passing through the spacious saloons and deck of this great ship, there is much to impress the spectator with admiration; but when he stands upon the brink of her main deck, and peers down 33 feet into the iron bowels of this ocean monster, he experiences a sensation of wonder. Her engines, from the Novelty Works, are massive and of prodigious power, and from the distinguishing characteristic of the ship. They are justly regarded as a masterpiece of mechanism, and, while they effect a great saving of space, are expected to accomplish a still greater saving in the reduced consumption of fuel—objects of paramount importance in the construction of ocean steamers. Some idea of the power of these engines may be formed from the following statement:—

Two bed-plates	each weigh 42 tons.
Two cylinders	50 "
Two beam pillow-blocks	23 "
Eight boilers	40 "
Two water-wheels (wrought-iron)	25 "
Two shafts	34 "

The shafts and cranks are believed to be the largest forgings ever made in any country. The engines of the *Adriatic* have two cylinders each, 100 in. in diameter, and 12 ft. stroke of piston. They are of the kind known as "inclined oscillators," coupled by simple and direct connections known as the "drag link," and are altogether the most compact and direct engines yet constructed.

The cylinders, which are of the kind known as "surface condensers," comprise the advantage of a large amount of cooling surface in a small space, with great simplicity and accessibility in all their parts, and are designed to afford a constant and unfailing supply of fresh water to the boilers. They contain numerous tubes of brass, through which is constantly passing a stream of cold water, drawn from the sea, and forced through them back into it again, by pumps connected with the shaft by an eccentric cam motion. By coming into contact with the interior surface of these tubes, thus cooled, the exhaust steam is condensed. It avoids all the incrustation, corrosion, and other difficulties attending the use of sea water.

There are eight principal boilers, Martin's patent, having 18,000 perpendicular iron tubes, and are arranged in sets of four, forward and aft of the engine. The whole number of furnaces is 45, there being six to a boiler. There are two extra boilers, with brass tubes, to be used in an emergency. The water-wheels are 40 feet in diameter, of wrought-iron, and each has 32 paddles, 12 ft. in length. The shafts are 38 feet in length, 27 1/2 inches in diameter, and weigh 34 tons. The actual propelling power of this enormous engine is estimated at 2300 horses. The *Adriatic* has eight more furnaces, and 2 ft. more stroke of piston, than the *Persia*.

Respecting the consumption of fuel, the probable rate of speed, &c., the engine-builders prefer to make no predictions, being satisfied to await results.

The hull is not less important than the engine: the dimensions are as follows:—

Length over all	351 ft.
Breadth of beam	50 "
Depth of hull	33 1/2 "
Carpenter's tonnage	5400 tons.

Beneath the saloons are the freight decks, where 1000 tons of cargo can be stowed, and 1200 to 1400 tons of coal, besides water-tanks for 10,000 gallons, exclusive of the ample provision made for a supply of water by condensation from the engines. But, to speak more particularly of the hull, it may be stated that in its construction the choicest sticks have been selected that the noble forests of the South and West can afford. In putting them together, bolts of copper, or galvanised iron, from 1 to 1 1/2 in. diameter, have been used wherever they could impart additional strength, and all the bolts clenched on rings, and trenails wedged. Diagonal iron braces, 4 feet apart, intersect the frames both ways, and the two sets are riveted together where they cross, binding the whole in an inseparable network; and outside the frame is an iron band, having the effect of a hog-frame. The frame is all of live and white oak, locust, cedar, and cypress, joined together in the strongest possible manner.

The *Adriatic* is rigged with two masts, and will have but a temporary bowsprit, to be run out as occasion may require. Though at present she is the largest ship afloat in the world (in tonnage measurement), and sits very lightly on the water, displaying her enormous bulk to a good advantage, the appearance of her magnitude is lost in her symmetry of her proportions.

Every possible precaution has been taken to insure the safety of the ship. An important feature is the introduction of water-tight compartments, similar to those which have been built in all the other ships of this line. The bulkheads are made of a durable thickness of yellow pine plank, crossing obliquely, with an intervening layer of thick felt, and the whole secured by horizontal timbers and stanchions. It is difficult to conceive how a vessel thus protected could ever sink from the effects of collisions—indeed, all the frames being filled in solid up to the water-line, the planking might be entirely removed from her bottom, and still she would remain water-tight; or, should water succeed in entering the vessel, the steam-pumps have a capacity sufficient to eject an enormous quantity of water.

For safety against fire, the measures of protection are equally thorough and complete. In all those portions of the ship adjacent to the engines or boilers, an uniform surface of iron or other incombustible material is presented; and between the iron surface and any wood-work is a woolen or hair felt, 3/4 inch in thickness, which forms a non-conductor of heat, and therefore an efficient protection. It also deadens any noise arising from the working of the engines. The boiler deck is entirely of iron. Connected with the engine are six large fire-pumps, and on the deck are three more, to be worked by hand. The ship is plentifully furnished with patent metallic boats. The principal anchors each weigh 3 1/2 tons, and the cables (each of about 100 fms.) are 2 1/2 in. thick.

The arrangements for the accommodation of passengers are of a luxurious character. The cost of the *Adriatic* exceeds 1,000,000.

THE DOVER STRAITS—FLOATING TUNNEL.—The idea of connecting England with France by means of a railway has long been talked of, and it is more than 60 years since Mathieu first conceived the notion that a tunnel would be a desideratum, but carefully made estimates are quite a novelty in the question. In opposition to the schemes of Thomé de Gammon and the tubular bridge advocates, it is now said that something between the two—a floating tunnel—would be far preferable, since, even estimating the expense per foot run to be the same for the two new projects as for their respective originals—the Thames Tunnel and Britannia Bridge—the viaduct would cost 40,000,000, and the tunnel 90,000,000, whilst the following is the estimate given for the tube:—

One thousand cast-iron pipes, 800 tons each, as 6d. 10s. per ton £3,900,000

Wrought-iron bands, screws, bolts for the junction of pipes, 15,000 tons, at 12s. per ton 180,000

Joining and sinking the pipes 180,000

Three thousand cubes of concrete, each equal to 4096 cubic feet 900,000

Three hundred spiracles, and their cubes and shrouds 120,000

Wrought-iron bands, connecting the tunnel with the great cubes 180,000

Abutments 100,000

Rails, locomotives, cars, &c. 140,000

Other expenses 300,000

Total expense £2,000,000

A railway is to run within this tube, which is to be above the bottom but under the level of the sea. Throughout the greater part of its length it may not rest on the bed of the sea, but be supported by its own buoyancy. This buoyancy is to be counteracted by iron bands connected with weights laid on the bottom of the sea. The tube will thus be put in the impossibility of rising to the surface, as well as of sinking to the bottom, and the depth of immersion may be regulated as to afford the freest passage of any vessel. The external diameter of the floating tunnel will be 18 feet, and its average thickness 6 in. There would be a more than sufficient strength even if the tube had an ordinary annular section; it shall, however, be trebbled by applying the cellular system. The weight of a cubic foot of sea water being 64 lbs, and that of cast-iron 454 lbs, we shall for the whole tube, in its length of a little more than 20 miles, have—The weight of water displaced... Tons 732,000

Weight of tube 600,000

Buoyancy 182,000

The buoyancy is to be counteracted by cubes of concrete. The treble iron in the floating tunnel will not be altogether deprived of the cheering benefit of the open air and daylight, for 300 large fannias, or spiracles, 10 ft. in diameter, shall spring from the top of the tube, towering above the level of the sea. The whole floating tunnel shall be composed of 1000 cast-iron pipes, of the aforesaid diameter and section. They will fit conically into one another, end to end, and their junction shall be strengthened and made water-tight by large bands of wrought iron, screwed and bolted to both elementary pipes on every line of junction.

THE MINING JOURNAL.

[DEC. 26, 1857.]

The Mining Market; Prices of Metals, Ores, &c.

METAL MARKET, London, December 24, 1857.

	COPPER.	2. 2. 4.	FOREIGN STEEL.	Per Ton.
Copper wire	p. lb. 6 1/2 - 1 1/2		Swedish, in kgs.	22 0 0 -
Iron tubes	" 2 1/2 - 1 1/2		" to arrive	21 0 0 - 21 10 0
Sheathing and bolts	" 1 1/2 - 1 1/2		Ditto, in faggots	23 10 0 - 24 0 0
Bottoms	" 1 1/2 - 1 1/2		English, Spring	18 0 0 - 23 0 0
Old [Exchange]	" 0 10 0 -		Quicksilver	18 0 0 -
Best selected	p. ton 110 10 0 -		SPKLT.	Per Ton.
Tough cake	" 107 10 0 -		Foreign	24 0 0 - 24 10 0
The	" 107 10 0 -		To arrive	24 0 0 -
South American.	" 90 0 0 - 100 0 0			
IRON.				
Bars, Welsh, in London	7 10 0 - 8 10 0			
Ditto, to arrive	6 15 0 -			
Wali rods	5 0 -			
Stafford, in London	9 0 0 - 9 10 0			
Bars	ditto	10 0 0 - 10 0 0		
Hoops	" 10 0 0 - 10 0 0			
Sheets, single	10 10 0 - 11 10 0			
Bar, No. 1, in Wales	3 15 0 - 4 5 0			
Redined metal, ditto	4 10 0 - 5 5 0			
Bars, common, ditto	5 15 0 - 6 5 0			
Ditto, railway, ditto	5 15 0 - 6 0 0			
Ditto, Swed. in London	13 0 0 - 14 10 0			
IRON-PLATES.				
IC Charcoal, 1st qua.	p. ox. 1 13 0 0 - 1 14 0 0			
IX Ditto 1st quality	" 19 0 0 - 2 0 0			
IX Ditto 2d quality	" 1 11 0 0 - 1 12 0 0			
IX Ditto 3d quality	" 1 17 0 0 - 1 18 0 0			
IX Coke	" 1 6 0 0 - 1 7 0 0			
IX Ditto	" 1 12 0 0 - 1 13 0 0			
Canada plates	p. ton 15 0 0 - 16 0 0			
Streets	" 9 0 0 - 100 0 0			
LEAD.				
Yellow Metal Sheathing	p. lb. 101 -			
Wetterstedt's Pat. Met.	p. swt. 2 2 0			
Ditto red lead	24 10 0 - 24 15 0			
Ditto white	27 0 0 - 30 0 0			
Ditto patent shot	20 0 0 -			
Spanish, in bond	21 10 0 - 22 0 0			
American	" 21 0 0 -			
Brass (sheets) ... p. lb.	11d.			
Wire	10 1/2 - 11d.			
Tubes	14d. - 15d.			
At the works, 1s. to 1s. 6d. per box less.				

REMARKS.—The most important matter that could influence a change in the state of our market, we are happy to say, has this day taken place, by the directors of the Bank of England reducing their rates to 8 per cent. We now confidently look forward to a gradual improvement in nearly all descriptions of metals, and unless we are very much deceived there will be a most flourishing business transacted in the course of the ensuing year.

COPPER.—There is a slight improvement in orders for shipment, and the holders of foreign qualities express themselves more sanguine in the realisation of higher prices. Buyers of Burr Burr would readily give 100%, but holders are not disposed to sell much below 105% per ton.

IRON.—The demand for Welsh has much increased, and merchants would do well to avail themselves of the present reduced rates, otherwise they may allow a good opportunity to pass by them. Prices are not at all likely to decline any further. Stocks must be getting very low abroad, and merchants will soon be pouring in orders, and everybody requiring delivery at the same time; to ensure the iron at the time wanted, it would certainly be better to contract at once. Bars have been in better demand, and promise a more remunerative price to the maker. Staffordshire qualities have been neglected, and prices are doubtful until the meeting in January next. Nothing of importance has occurred in Swedish bars.

TIN.—There is a wide difference between the quotations of English and foreign, and we question whether the smelters will be able to sell English while Bars can be purchased at 100%, and Straits at 99% to 100%. This manifest difference in the two qualities is too apparent for buyers to entertain English, Bars being of very even quality, and serviceable for almost the same kind of work as English. Straits of very fine quality quoted by sellers at 100%. Stocks of foreign are large in warehouse here.

TIN-PLATES.—Our market remains steady at last week's prices, but few second-hand parcels are to be met with.

STEEL.—Swedish keg, hammered, is scarce; rolled, on the contrary, is rather burdensome.

QUICKSILVER.—

THE PROGRESS OF MINING IN 1856.
BRINGING THE THIRTEENTH ANNUAL REVIEW.
By J. Y. WATSON, F.G.S., Author of the *Compendium of British Mining* (published in 1843), *Glossaries among Mines and Miners*, &c.

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how this can be effected by an association of the several mines; we are perfectly aware that if this can be settled by resolutions, the whole affair is *un fait accompli*; we had an instance of this in the Committee for the purpose of watching the Rating of Mines, and yet we have hitherto never heard any report from them, and the world is in ignorance of their labours. If the miners wish to have a smelting-house to reduce their own ores, so that they may obtain a fair price for their copper, and thus be independent of the smelter, it is a matter of paramount importance, in the first instance, that there should be union amongst them, and a fixed determination to resist any attempts which may be made prejudicial to their interests. In order for a number of associated mines to do this, it would require that a certain amount of capital should be subscribed; and, to ensure the healthy working of the undertaking, the ore, after it was turned into copper, should be held over according to the market, as is now practised by the smelters; there are, no doubt, many mines who are in condition to do this, but we would ask this simple question—how many are there who can do this, and even if they could do so?

The experience we have acquired through watching miners and mines for a series of years, enables us to say that many of these undertakings depend upon the smelter for their being carried on; this, we admit, is not as it should be, but while mining is carried on so much as a speculation, such being now the case, and so little as an investment, as it ought to be, this state of things must be considered as their normal condition. It is no use blinking the fact; shareholders have a great dislike to pay calls even for the prosecution of the mine, and instances are constantly arising of the men being two months behind their pay, whilst suits at law, by merchant creditors against defaulting shareholders, are of daily occurrence. The moment a mine makes the adventurers are anxious to get, however so small, a lot in the ticketing; the realisation of the ore will prevent further calls, or at least will go some way towards the expenditure, and thus many people dispose of their interest so soon as returns are made. It is futile to imagine that this class, and there are numbers of them, would join in such an association, which would require combination and perseverance. Their motto is "every one for himself, and Heaven for us all;" quick returns and a profit, whether large or small, being their maxim.

We will not enter here into the question of the vast influence that the smelter at present possesses, both in his facility of obtaining information from abroad, and the opportunities he has of acquiring a knowledge of the market at home. It has been suggested by some that the miners, if they held over, could obtain loans from the bankers on the ore. Apart from the difficulty of ascertaining the value of ore at grass by assay, which in many instances differs from the sampling, the question would often arise whether this was taken fairly, it must be remembered that to be rendered available it has, at the least, five processes to go through before it can be converted into copper, this taking three weeks, and then must be reduced by those very monopolists whose trade the miner is endeavouring to destroy. What would they give the banker for his ore when he was entirely at their mercy? These are but few points, many more might be urged; we have no wish to damp the energies of any party, we would merely advise them that, before taking any decisive step, they should maturely consider the subject, and weigh it in all its bearings: should they then see they are likely to accomplish their object, we can only say, "go on, and prosper."

It must be borne in mind that wherever smelting-works have succeeded abroad they have been conducted by competent individuals, who have had adequate capital to back them; there have been instances where these have failed from incompetency and deficiency of funds, happily these cases are of seldom occurrence; the products there made are sold at the market price of the day, and the merchantable article fetches its real value.

With these brief observations we conclude; and thus we recapitulate what we have said—smelting copper, as a process, is perfectly simple. It, however, requires a large capital, and considerable knowledge of the market; the profits are commensurate with the risk, but as companies and associations are now constituted, we question much whether they could successfully compete with the present body so firmly established in this trade. A company, with its cumbersome machinery and limited means, is no match for individual energy, backed by large capital and long experience.

The LORD CHANCELLOR, with the LORDS JUSTICES, have confirmed the decision of Vice-Chancellor STUART with respect to a bill filed by Mr. ROBSON against the Earl of DEVON, as representing the Melbourne Gold and General Mining Association; Mr. MOORE, the promoter of the company named; and Mr. TAIR, a broker; which Vice-Chancellor STUART decreed was not held out by the evidence, and dismissed the same with costs. The present appeal, in the form of ROBSON v. THE EARL OF DEVON AND OTHERS, was to annul such decision, but the Lord Chancellor held that the Vice-Chancellor had acted rightly, and affirmed his decree, except as respects the costs against the defendants, Mr. MOORE and Mr. TAIR. In this view Lord Justice TURNER concurred, as did also Lord Justice KNIGHT BRUCE, excepting as regarded the costs, as he thought none of the defendants were entitled to them, for although the grave charges against them had not been made out, yet, looking to the whole of their conduct, he thought that the plaintiff was entitled to be exempt from paying them any costs.

Our readers will, doubtless, remember the general merits of the case, which were given at the time of the investigation before Vice-Chancellor STUART; therefore it is only necessary to reiterate the principal points. The plaintiff, Mr. ROBSON, a stockbroker, filed a bill against the Earl of Devon and the other members of the committee of management of the Melbourne Gold and General Mining Association, to recover payment of a loan of 5000l. advanced to the company, and also the value of certain shares of the company which he took, as he alleged, through the fraudulent representations of certain persons who were agents of the directors. The plaintiff contended that Mr. MOORE, acting as agent of the directors, obtained a loan of 5000l. from him on the security of 1000 shares, which had been originally destined for Mr. SCOTTHORN, the engineer, and also had given instructions to the plaintiff to purchase 1200 shares in the company at a price not exceeding 2s. 6d. premium. The defendants denied the alleged authority. It was urged for the plaintiff that the transactions in question were the result of a fraudulent scheme concocted between MOORE and the committee, and that the representations as to ownership of shares made by the defendants, Mr. MOORE and Mr. TAIR, were false and fraudulent. The decision of the Supreme Court necessarily invalidates these charges, and the matter at issue is now finally set at rest.

The LONDON AND WESTMINSTER BANK has called its proprietary together for Jan. 20, and the LONDON JOINT-STOCK BANK for the following day, to receive reports from their respective boards of management, and to transact the usual half-yearly business. These will be the first of the London associations which will display statements of their affairs since the occurrence of the great monetary panic from which this country is only beginning to emerge; so that the explanation of their position, made up to the end of the year, will be received with more than ordinary interest; not only by the shareholders themselves but by the public at large, which is so vitally affected by the movements and power of the banking community. The balance-sheets will show the consequences which have accrued to these establishments, whether favourable or otherwise, by the derangement which has occurred in our commercial and mercantile transactions; and as the London and Westminster and the London Joint Stock may be taken as a criterion of the London joint-stock banks generally, as respects business influenced by monetary panics, the *résumé* of their affairs for the last six months will indicate, more or less, the result which has attended the transactions of other establishments of the same kind.

It has been freely argued that the joint-stock banks have reaped large profits from the dearth of money, notwithstanding that their powers of discount and of loans have been much curtailed by the extensive withdrawals of money placed with them "at call"; but, considering that the rate of interest to the lenders or depositors in such banks has increased in proportion to the charge made for accommodation or discount, it is contended by others that the argument adduced is not sound, consequently it will be both interesting and important to have this question settled by the forthcoming statements of the doings of the banks mentioned.

Joint-stock banks, when conducted on sound and honourable principles, like the London and Westminster, the London Joint-Stock, and other leading proprietary banks in the metropolis, are necessary for the due carrying on of commercial undertakings. They are the legitimate support of the trading and mercantile community in monetary matters, and while the basis of sound banking is strictly adhered to by the directors, or those who manage such establishments, no serious consequences need be apprehended either by the shareholders or depositors; but, on the contrary, great advantages must accrue to the one, in the shape of large dividends, while the latter have good interest for their money, with undoubtedly se-

curity for the principal. It is when joint-stock banks depart from what is business-like, or usual, that fatal effects, if not total ruin, become the portion of the shareholders and depositors, while the public at large is rendered distrustful of such institutions by the scandal which is brought to light. This fact is now patent to the world, by the career pursued by the different joint-stock banks which have recently closed their doors, in consequence of the reckless manner in which they advanced money, in enormous sums, to individuals and firms of doubtful position—even to those who were not within the pale of commercial circles. To such an extent has this monstrous system been carried, that in one instance a large sum was lent for seven and fourteen years, at 5 per cent., to support a speculative builder in one of the metropolitan suburbs, and the transaction arose from no other cause than that the borrower was the neighbour and personal friend of the manager of the bank. We understand, now that the houses are finished, that there is ample security; but the end does not justify the means, and as this security forms part of the assets of the defunct bank, the shareholders must necessarily wait for the period of the loan to expire before the capital advanced will be repaid, or a compromise must be entered into for prompt liquidation of the debt, to the great advantage of the borrower and the equal great loss to the representatives of the lender.

Such is the sequel of business conducted on loose principles; and it is well that such banking establishments are removed from the list of joint-stock banks. A different picture will be presented, no doubt, by the various London banks which will now soon hold their half-yearly meetings, and follow in the wake of the London and Westminster and the London Joint-Stock. However much it may be questioned whether they have reaped benefit by the panic or otherwise, no one for a moment considers that their financial statement will demonstrate anything either unsound or irregular in their system of conducting business.

The termination of the trial of GREAVES v. WHEY AND CRAWFORD, of which we gave particulars last week, has had the effect of producing great animation in all matters connected with the LITTLE DOWN AND EBBER ROCKS MINING COMPANY. If the result had been a verdict for the plaintiff it would, in fact, have been fatal to the prospects to this enterprise, for the essence of the charge was to establish fraud and misrepresentation against Mr. WHEY, the proprietor of the soil, as well as against Mr. CRAWFORD, the promoter of the association named. The issue being, however, in the reverse sense, and established on such scientific and practical evidence, that the rebound in favour of the company is much greater than was the distrust and doubt produced in the minds of the public by the imputations so freely circulated. The evidence in refutation of the charge was so clear and conclusive that all who heard the trial must have been impressed with the conviction that the prospectus was fully borne out in every statement, and that the property, consequently, was one of much value for the production of iron ore and manganese. It is, therefore, with no surprise we learn that it is the intention of the promoters and present shareholders of the Little Down and Ebber Rocks Mining Company to give full vigour to the works, and to introduce the project publicly, at the commencement of the new year, modified so as to lighten the payment for the shares, and to meet the wishes of the more general investor. The association has naturally been kept in perfect abeyance since the prejudicial rumours and open statements were current; but, from the offers of co-operation which we are assured, have been made, there can be no doubt but that the company will quickly make up the leeway, and show that it does possess a property of no ordinary value for the production of various minerals.

The evidence adduced for the defence on the trial has established the fact that a large deposit of hematite iron ore exists in the proximity of Bristol; whence, of course, there are ready means of transit, either by water or by rail, to all the different districts where this ore is particularly required, so that a ready, and we presume a very profitable, market will be the mere sequitur of a regular supply; consequently there would seem to be every just ground for believing that the Little Down and Ebber Rocks Mining Company has only to use ordinary activity and business-like development of the mineral resources at its command to establish a trade with every prospect of extensive and beneficial results. This is another instance that out of apparent mischief good results. The association named might have had a long struggle to establish the fact that it possessed so large and so rich a deposit of ores, if it had only proceeded in the ordinary way; but being put on the defensive, its promoters were compelled to substantiate all that had been asserted in the prospectus, and in doing this they established facts much more than had ever appeared in any publication emanating from the company, or asserted by their warmest supporters. The production of rich iron ore is a matter of general interest in this country at this moment, when many of the localities hitherto very productive are showing strong indications of decrease, and when the demand for iron in all its shapes is so rapidly increasing, especially as articles of export to our various rising colonies and many foreign countries, where railway extension, and other public undertakings, are beginning to make rapid strides, and thus produce a necessity for the manufactured metal, which must be chiefly supplied from our own shores.

In former remarks we mentioned that the directors or committee of management of the BRITISH ROCK AND PATENT SALT COMPANY take on themselves, it is asserted, the power of placing an embargo on all sales of shares to others than those whom they may permit to become proprietors of stock—in fact, declaring their right to reject or receive the name of a purchaser, as they may deem proper—and asserting that the course they pursued is warranted by the provisions of the deed of settlement under which the company carries on operations. A correspondent, much interested in the progress of this association, contends that "the absurdity of this course is so apparent to anyone who has the slightest knowledge of law in such matters, that I do not consider it worth while to dwell at any length on the point, nor would I now recur to the subject had I not just ascertained that the committee of the GREAT WHEAL VOR MINE are adopting a similar line of dictatorship; therefore it becomes necessary to draw attention to the fallacy of the rules of these two associations, and to urge your powerful influence in putting an end to this vexatious principle." Our correspondent then goes on to contend that it has been settled long since that a share is the property of the holder, as much as his carriage or his horse, or any other thing which he may possess, and no restriction imaginable can deprive him of his right to deal with such security as he thinks proper: nor can the law be abrogated with impunity to suit the caprice of any body of directors or shareholders; and that if the principle laid down by the British Rock Salt and the Great Wheal Vor Companies were possible to be held legal it would at once destroy the basis on which all trade and commerce in this country is transacted, and quickly become fatal to all undertakings which require the capital to be raised from a proprietor. "Who would embark in a project," says the writer, "no matter its nature, if he could not realise at pleasure, and without any interference or dictation on the part of a committee? If the conduct of the British Rock Salt and Great Wheal Vor Companies were tolerated as a rule we might as well live under an autocrat altogether, for it is the very essence of absolute and despotic power to say that a man is not free to do as he will with his own."

Such are the views enunciated by our correspondent on the question mooted by himself. Whatever may be the law on the point, it is undoubtedly that the custom which has prevailed for a long period is at variance with his opinions, especially in respect of companies in which the entire amount of the share is not paid up; for it not unfrequently occurs that proprietors dispose of their interests to mere men of straw, to evade the payment of further calls, when prospects look unpropitious. The effect of this was shown in the recent disclosures connected with the Royal British Bank, where a director availed himself of the facility of transfer to remove his personal liability. It is possible, no doubt, in individual cases, that the rule occasionally works with disadvantage, and committees and directors may at times act capriciously; but, on the whole, it is considered that the custom is based on a solid foundation, and is not fraught with the mischief which our correspondent seems to apprehend. The legal point of the question could be easily and inexpensively tested, but for our part we do not see what general benefit would accrue from a disturbance of the system adopted, even if it were custom and not law.

We are informed that in the British Rock Salt Company there are three trustees, three auditors, and six directors; and as these official gentlemen are shareholders there is the best security to the general body and the public that the interests of the undertaking are not neglected. This does not at all follow. Experience shows that the very reverse is frequently the fact, and of this there is evidence in what has transpired in consequence of some of the recent failures in the metropolis. The circumstance, moreover, that the directors of this company do not either publish or circulate any report or statement of their affairs, and merely read the

document at their meetings, lays them open to suspicion, more especially as the representatives of the press are excluded; for it is argued, and very reasonably, that if there be nothing to hide, why such unusual caution and secrecy? We have endeavoured as much as possible to elucidate the position of this enterprise for the information of our correspondents; but the utmost reserve is shown in quarters where information could be given; and it appears that the initiative must be taken by some shareholders to obtain, in a court of law, that proper explanation which might be rendered with facility by the officials of the company, if they were disposed to meet the wishes of many proprietors.

We have more than once alluded to Mr. SQUIRRE's process for reducing gold matrices, and, by the same action, concentrating the oxides of the precious metal into visible globules. It is undoubtedly a most astonishing discovery, and one which should produce vast benefit to the different associations connected with the question of gold production; especially those now almost defunct, which were formed within the last few years for the supply of the precious metal, both from California and Australia, but which have failed to realise the expectations held out to the shareholders, in consequence of the difficulty of applying economically any known means for the proper reduction of the ores, and separation of the metal, without the almost total loss of all which was in a non-metallic state.

The extraordinary position, in a monetary point of view, which this and other countries have presented for a long time past, has necessarily retarded the general introduction of this and other valuable scientific applications to matters connected with the mining interests. We now find that Mr. SQUIRRE, having obtained the unanimous approval of his system by scientific gentlemen, will take the initiative at the commencement of the year. He requests, therefore, that shareholders in all gold companies will call at his office, that he may submit his plan for their consideration, and at the same time show the effect produced by his process on all gold ores, without reference to the matrix or the hardness thereof. An announcement to this effect appears in our advertising columns. We believe that the object of Mr. SQUIRRE is to form an union of all the gold companies which are in a state of abeyance, as respects profitable yield and dividends—at least so far as is necessary, to give full vigour to the works which he proposes to establish.

What we have witnessed is certainly quite astonishing, and if the same results be obtained in works on a large scale which Mr. SQUIRRE produces from moderate quantities of quartz and other matrix, a desideratum of no mean moment will have been attained for the whole body of shareholders in the various gold mining companies.

On this point Mr. SQUIRRE contends that extensive operations will be even more marked in the issue than trials on a small scale, or even the reduction of moderate quantities. A very large amount of capital has been invested in these projects, and, hitherto, without apparent prospect of profitable returns, so that any reasonable suggestion for the benefit and amelioration of the condition of the shareholders is worthy of full investigation.

THE IRON AND STEEL QUESTION, BETWEEN INVENTORS, CRITICS, AND WORKERS.

The claims of inventors are generally regarded in such a light by the parties interested that it is almost impossible to discuss them without being considered unjust on the one side or other; and, therefore, it seems desirable in offering some remarks on the subject which, under the name of "the Iron Question," has been so much discussed in this Journal, that they should be prefaced by the assurance that the writer is altogether an uninterested person, regarding the question only from a common sense point of view, so far as date exist for doing so, and by the aid of such well-established facts connected with the subject as are generally received by metallurgists. So far as Mr. Mushet is concerned, there is probably less reason to fear his dissatisfaction at the opinion given, since he has expressed his desire for further information as to the peculiarities of the several processes patented, and the reasons that they cannot succeed.

First, then, as regards the conversion of pig-iron into malleable iron or steel, by forcing air through the melted metal, Mr. Mushet does not question that this is the invention of Mr. Bessemer, though he denies that it is practically complete without the application of his method.

The reality of Mr. Bessemer's idea, as far as decarbonisation and separation of silicon are concerned, has been tolerably well proved. Malleable iron of very excellent quality has been produced by his method. Nevertheless, the practicability of his method of producing iron appears to be negative. The reason of this is that while carbon and silicon may be entirely removed in this way, sulphur and phosphorus are not reduced in amount, but actually increased, owing to the conversion of a portion of the iron into slag.

This circumstance, together with the fact that sulphur and phosphorus are present to a greater or less extent in all British coke pig-iron, and the necessity of separating these substances in the production of good malleable iron or steel constitutes the present practical inferiority of Bessemer's method to puddling. The specimens of malleable iron obtained by Mr. Bessemer's method were produced from pig-iron, containing amounts of sulphur and phosphorus so small as not to be detrimental, hence the good quality of the bar-iron obtained; but the pig-iron used bears a price too high to admit of its being used for conversion into bar-iron.

For the production of steel, however, the high price of the pig-iron is not so much a matter of moment, since the greater value of this form of steel admits of the use of metal which, like the Acadian, is free from injurious admixture of these substances. Undoubtedly, this fact very much limits the value of Mr. Bessemer's method, even as regards the separation of these substances that an improvement remains to be made upon the method of converting pig-iron into malleable or into steel, so as to render it practically applicable to the average pig-iron of this country.

Mr. Mushet seems to be under the impression that there is another patented method which may be substituted for Mr. Bessemer's in the production of malleable iron or steel. This is Martien's method; but in particular he seems to overlook that, in the terms of the specification, the method is intended solely for the *purification* of pig-iron that is afterwards to be puddled; that it is, consequently, a substitute for the present method of hearth refining, and that no claim is made by Mr. Martien for the puddling of the metal either into steel or malleable iron. But, even if it is admissible to reduce the incline of Mr. Martien's gutter, and to increase the number of air jets, so as to convert the pig-iron, without infringing Mr. Bessemer's patent, this method is still considered by Mr. Mushet incomplete without the conjoint application of the method for which obtained a patent.

Mr. Mushet sets out with the statement, that "when cast-iron has been purified, or decarbonised, by the action of air blown through it in a liquid state, it has been found that, although the metal is nearly, if not wholly, decarbonised and purified from silicon, &c., yet the ingots obtained in this way prove to be incapable of extension by hammering or rolling any temperature. In some instances they may be extended, but the produced have cracks or flaws along the edges; and in other instances, again, though tolerably sound bars may be obtained in the usual way, are found to be either 'red-short' or 'cold-short,' and the fracture neither granular nor fibrous, but crystalline. Moreover, the ingots cast are generally cellular, a circumstance which increases the tendency to crack while being extended into bars."

Here, then, are four defects definitely stated as existing in steel produced by forcing air through melted pig-iron. These defects are means novel characteristics of iron, and therefore cannot fairly be regarded as necessary results of the method of conversion, but as defects for venting or counteracting which that method, as it stands, is inferior to puddling. The method by which Mr. Mushet proposes to remedy these defects is very analogous to Heath's method for steel. After the iron has been decarbonised, he alloys it with "triple compound," which is essentially manganiferous pig-iron; this he adds in such proportions as to give the whole mass the particular amounts of carbon which are known to exist in malleable iron, or the different kinds of steel.

Now, as regards iron, the fact of the bars cracking at the edges being rolled has generally been referred to excessive decarbonisation. Good malleable iron always contains some 1-2000th of carbon; and it has been ascertained, by direct experiment, that iron entirely free from carbon presents the character of what is technically called "burnt iron." It is very probable that iron which has been decarbonised to this extent also contain some oxide of iron disseminated through it, which, as in the case of brittle copper, lessens its coherence and extensibility. For the defect, assuming that it is due to these causes, the remedy proposed

Mr. Mushet, appears perfectly feasible, for it would be a means of restoring the proper amount of carbon to the metal, and, in all probability, at the same time remove any oxide of iron that might exist in it.

With regard, however, to steel that cracks while being rolled, the above explanation is inadmissible, because there is still carbon present; and this character in steel is probably due to the presence of some other substance.

There is good reason for believing that the "red-short" or "cold-short" characters of iron are owing to the presence of sulphur or phosphorus in the metal. It is known that some kinds of good bar-iron contain phosphorus, and, also, that a certain amount of this substance communicates hardness to the metal, which is advantageous; but it is nevertheless certain that when the amount of phosphorus exceeds a certain limit, the iron is "cold-short." It has not been shown that sulphur is in any way serviceable in iron, but that "red-shortness" is a constant character of iron containing upwards of 1-10,000th of sulphur is quite beyond question.

It has, indeed, been stated, in opposition to these facts, that in the puddling operation a workman can at will produce from the same materials good iron, or such as is red-short or cold-short. This is stated as the example of practical ironmasters, and, therefore, is not to be questioned; but it must, at the same time, be remembered that it is by puddling that the sulphur and phosphorus of pig-iron, together with the carbon, silicon, &c., are separated, or their amounts reduced within a proper limit; and, consequently, it is not at all remarkable that this separation should succeed or fail, according as the puddling is well or ill-conducted. It is precisely in this particular that the conversion of melted pig-iron into steel or malleable iron, by the action of air forced through it, is inferior to the methods of cementation and puddling.

Mr. Mushet appears to imply, or at least his supporters appear to assert for him, that the method for which he has obtained a patent removes this difficulty, as well as the one first referred to. It is, however, certain that upon the face of the matter this does not seem to be the case. Mr. Mushet says, in a recent letter, that he is not a chemist. This is evident in his case, as in the specifications of most inventors; and though he adds that he "knows the chemical alphabet," it is clear that he cannot spell with it. There are no known facts which would justify the belief that by his method of treating decarbonised metal the sulphur or phosphorus would be either separated or reduced in amount. In addition, we have the fact that the Ebbw Vale Company have not attempted to carry his method into practice, although it seems they have an interest in his patent right, and, as Mr. Mushet states, might make a profit of 100,000/- per annum by working one furnace, assuming the steel realised 28/- per ton. The Ebbw Vale Company are probably not more averse to making money than the generality of mankind, but from their inaction, though interested, together with the improbability, so far as a chemical view of the matter goes, of Mr. Mushet's method being equal to remove sulphur and phosphorus—the great obstacle to the practical working of the method in question—it becomes extremely desirable that some satisfactory evidence should be furnished by Mr. Mushet of the value and practicability of his method.

The cellular character of the ingot of steel or malleable iron is a great defect of the Bessemer method; it has not, however, anything to do with the presence of oxide of iron in the metal, but is caused by the evolution of gases, probably carbonic oxide, simultaneously with the solidification of the metal. Chemistry does not afford any reason for believing that either carbon or metallic manganese could in any way influence his defect.

If the addition to decarbonised iron of manganese pig-iron, which constitutes Mr. Mushet's method, does effect the separation of sulphur and phosphorus, it still remains for Mr. Mushet to make known the mode in which this result is produced, or at least to demonstrate it by trustworthy analyses of the pig-iron used, and of the product obtained. It may, indeed, be said that the specimens sent to the office of the *Mineral Journal* are a sufficient demonstration so far as steel is concerned; they are certainly, to all appearance, very excellent steel, but they have been mostly produced from Acadian and Indian pig-iron, and are certainly not superior, in any respect, to the steel produced in the same way from Acadian g-iron, *without the application of Mr. Mushet's method*.

Some of the specimens are stated to have been provided from "Dean west coke pig-iron," but no information is given as to this pig-iron, whether it contained sulphur and phosphorus or not. If the pig-iron from which this steel was produced was similar to the average of British coke pig-iron in this respect, then, indeed, it must be admitted that Mr. Mushet supplied the second step that was required in order to render Mr. Somer's method of producing steel and iron practically valuable.

THE MINING AND INDUSTRIAL INTERESTS OF CORNWALL.

[FROM OUR CORRESPONDENT IN WEST CORNWALL.]

Dec. 23.—We are now in the Christmas season, when mining business is usually very dull, and festive enjoyment is the principal thing attended.

The fourth sale of copper ores for the month will take place to-morrow; the number of tons are unusually small, and it is hoped from this, one or two other circumstances, that the standard may go up a little, is unfortunate, however, that one of the copper companies has lately ceased purchasing. The Spurley Company (Schneider and Co.) have

no ore since Nov. 18; and it is rumoured that their works are likely

to fall into the hands of two of the older and richer smelting companies, at the miners want to see is a larger number of companies, and not a smaller body, that would find it easier to act in concert, and make the monopoly still more compact and complete.

At the sale last week (Dec. 18), the standard was 2/- higher than in the corresponding week of Nov. 18; seeing that the accounts from America are encouraging, and a few

arriving for metallic manufactures, and that a reduction of the rate of discount, which may be soon confidently expected, is likely

to improve our home trade, we may fully incline to the opinion that the disastrous time for the mining interest is now passing over, and that

the probability the spring of the year will bring us again a period of

considerable prosperity. It is remarkable that the mining interest has

so well a crisis which has shaken commerce to its centre. We may

look forward with confidence to better times; and, under this con-

dition, mining shareholders will endeavour to retain their shares for the

at, rather than dispose of them at such a sacrifice as must be made

the existing low prices.

A price given by the smelters for ore copper last week was 81/- 16s. on, and an acre copper in 107/- 10s., there is a difference of 25/- 15s.

in between the buying and the selling price, including the "return-

charges." It is believed that this is a much larger margin than there

is not likely to be much improvement as long as the present smelters

the entire command of the market for copper ores.

no shares continue low, especially the shares of tin mines. West

have somewhat declined, and it is said the mine is not looking so

adjoining and older mine, Wheal Seton, though it paid no di-

ad at the last meeting, has some encouraging features; the best end

mine is in the 90 west, on the middle lode, which is producing

per fm.; and there are other ends and stope on the north and south

lodes, which are likely to keep up the present productiveness of

mine; besides which they are driving a cross-cut in the 110 fathoms

73 fms. west of Tilly's shaft, to intersect West Seton north lode,

at less than 30 fms. from Wheal Seton boundary, is very produc-

another cross-cut, to intersect the same lode, is being driven from

shaft in the 110, that shaft being now down 7 fms. below the

The profit on the last two months' working was only 82/-, but, in

years, this mine has been very productive. From 1838 to 1856

Seton sold 57,620 tons of copper ore for 300,212/- Two young

in the same locality, New Seton and South Seton, are considered

very promising, looking at their strata and position; but as mines

to make much ore until a considerable depth is attained, much

to be expected from these new mines for some time. South Frances

are from 220/- to 230/- North Frances about 10/- The prospects

at Wheal Busy seem to some of the adventurers very encourag-

ing, as they have originated a subscription for a testimonial to Captain

as an acknowledgment of his ability and energy in opening up

At Dolcoath, the adventurers have resolved to stock one-third

tin raised, until better prices are given, the present production of

the being fully 60 tons per month. The tin sold from this mine is

to produce, the average price for the last five years (before the late

reduction) having been 72/- per ton. The reports from the mine are

favourable as they were, as the estimates are in proportion to the

reduced price of tin; the stope and pitches, however, are pro-

the same quantities as two months ago, and there are some capital

ends in the mine; the engine-shaft, on the south part of the main lode, is down to the 264; on the north part, the 242 east is worth 25/- per fm.; and there is a rise over the 242 west, and a winze under the 230 west, worth 120/-, and 100/- per fm. The 230 west is worth 40/- per fm., and the 220 west, 50/- per fm.; the 230 west, on the south lode, is worth 28/- per fm. The mine is judiciously managed, and large dividends will again be paid as soon as the price of tin goes up. There are now 26 tons in stock, but against this must be set the fact that the mine was in debt at the last meeting 894/-, including 550/- for new erections.

Wheat Basset shares are about 145/- South Tolgas Mine is reported to be looking better. Condurrow is gloomy at present, and shares are low. East Falmouth is looking well, Chennall's lode being very productive; shares are 4/- and upwards. West Alfred continues to look very encouraging, and shares are at 32/- In Pendine, a large number of shares have lately changed hands, but mostly out of the county. Wheal Margery is looking rather dull. The tin miners are stopping unproductive work as much as possible, until the price of tin advances. It is very satisfactory to find that the Great Wheal Vor shareholders have determined to see the bottom of their mine, when, if the reports of the former workings be correct, they will be rewarded for their spirit and perseverance. The fall in the prices of produce (or rather the fall of from 20/- to 22/- per ton on tin) was a severe trial to this mine; and to that circumstance was owing the reports in some parts of the West, now proved to be groundless, that the mine was about to be abandoned. It is said that this mine once yielded from 150 to 200 tons of black tin per month; if it can be again brought up to the same productiveness, when the bottom is reached, the mine will prove to be a splendid property.

In the County Court, at Penzance, Mr. Jas. Hollow, of Lelant, purser and mine-broker, sued Mr. Henry Wm. Viner for the sum of 13/- 8s., being the difference in price between 5-120th shares in Alfred Consols, sold by him in Nov. last, at 15/- per share, and a purchase of the same number of shares from another person at 17/- 6s., for the purpose of supplying the shares which Mr. Viner had failed to produce. After a long hearing, the jury gave a verdict for the plaintiff for the full amount claimed; and, in the course of the case, the attention of the judge was called to the transfer-book of Alfred Consols, which was produced by Mr. Henry Noell, of Hayle, and indicated, as it was said, the immense amount of jobbing that had taken place in the shares of that mine; the share transfers for 16 or 18 months forming a volume of from 1½ to 2 ft. thick.

REPORT FROM YORKSHIRE, DERBYSHIRE, AND LANCASHIRE.

[FROM OUR CORRESPONDENT IN CHESTERFIELD.]

Dec. 24.—The approach of the Christmas holidays, and the close of the year, when annual balances are made up and compared, are circumstances which tend to promote that dulness which now pervades the different departments of the iron trade; but there are indications which afford room for hope that early in the new year we shall have a better state of trade generally. The latest advices from America are more favourable, and the prospect of the arrival of large orders are good. It appears tolerably certain that the money market, which already exhibits signs of improvement, will be in a better position in the new year.

The Coal Trade is not so active as usual, owing to the depression in the cotton and woolen trades, which has much lessened the consumption for manufacturing purposes. The coal trade in these counties is in a much more satisfactory state than in Staffordshire; and although notices have been given pretty generally of a reduction in wages, up to the present time there has not been any evidence of dissatisfaction on the part of the men. The bodies of the four unfortunate men who were suffocated in the Hollingwood Pit, Staveley, have not yet been recovered, though no exertions have been wanting.

A very serious accident occurred at the Speedwell Pit, one of the Staveley collieries, on Friday, by the breakage of a portion of the metal tubing which lines the upcast shaft, which is 173 feet deep. The water rushed through the orifice with such force as to destroy the regular course of the ventilation, and as it was finding its way amongst the old workings, the men were compelled to suspend work, and leave the pit without the least delay. This was the largest colliery at the works, and the yield of coal was very considerable. It afforded employment to about 400 hands, nearly all of whom are thrown out of work. It has been Mr. Barrow's usual practice, when accidents have occurred, which suspended work at one pit, to transfer the whole or greater part of the men to other pits on the works, but, unfortunately, he is prevented doing so at present, owing to the Hollingwood Pit being still in an unworkable condition, in consequence of the late accident.

There is nothing particularly new this week in reference to the lead mining operations in Derbyshire. On Wednesday afternoon the directors of the Mill Dam Mining Company held a meeting at Chesterfield, when some important business was transacted. The meeting was a highly satisfactory one, and the prospects of the company were stated to be very encouraging. The first call of 34/- per share was made, to be paid on or before Jan. 4, 1858. Mr. Clement Morton, of Bradwell, was appointed manager of the company's property. The mine adjoining to Mill Dam sold 35 tons of ore on Wednesday, the produce of six weeks.

In Derbyshire, the production of coal during the present year has been largely increased by the opening of several new collieries. There are now 240 collieries, employing upwards of 20,000 workmen. During 1856, the production of coal was upwards of 4,500,000 tons, against upwards of 4,000,000 tons in 1855; and during the present year it is calculated that the increase will be upwards of 10,000 tons. In Yorkshire, where there are 343 collieries, the increase will be very considerable. The condition of employment in these counties is much more satisfactory than in many other coal districts; for, though notices of a reduction in the wages of the men have been pretty generally given, there have been no indications of present dissatisfaction. Christmas holidays and Christmas customs will occupy much of the ensuing week, and as another year will have dawned upon us before our next epistle is penned, we wish a merry Christmas and a happy new year to the lead miners of Derbyshire, and all those whose capital and enterprise is aiding the development of our mineral riches.

REPORT FROM MONMOUTHSHIRE AND SOUTH WALES.

[FROM OUR CORRESPONDENT IN SOUTH WALES.]

Dec. 24.—The strike at Aberdare does not appear likely to terminate so soon as was hoped. In one or two pits the men, who last week returned to work, have again turned out, and intimidation is used to prevent those from working who would be glad to do so. Some strangers have been brought from a distance, but their advent is regarded with great hatred by the colliers, who hoot at them, and fix threatening notices to their doors. The Merthyr men fortunately keep quiet, and are not likely at present, nor we hope at any subsequent period, to follow the example of their misguided fellow-workmen. The masters are still firm in their determination to stop their works altogether rather than concede to the terms of the men. Indeed, in the present state of trade, it is absolutely impossible that they could pay the wages demanded. The men know this, and many of them do not hesitate to profess their belief in it publicly, and recommend a return to work; but these are, unfortunately, over-ridden by the majority. Public meetings are still held daily, at which the wildest nonsense is uttered; the only arguments brought forward in favour of the strike are two:— "First," say they, "the masters can pay us what we ask if they like;" and, secondly, "We can't live upon less." Both these statements have been proved untrue, and Mr. Bruce, the Member for Merthyr, recently demonstrated their fallacy to the men so clearly that nothing further could have been required by people disposed to listen to reason. The men last winter had less to live upon, although getting full wages, than they would have now at the reduced terms, in consequence of the relative price of provisions this and last year. Whatever may have been the origin of the present strike, it certainly was not want, and we are afraid that a long and prosperous course of full work has caused the colliers to labour under the delusion that no revolution could ever come, and that wages would never get lower, although they might get higher.

The first instance in which the magistrates have been called upon to adjudicate in connection with the strike occurred this week. Isaac Thomas, a collier, residing at Gowbridge, was brought up at the Aberdare Police Court, on Tuesday, charged with having concerned in a riot at Mountain Ash the day before. The facts of the case are those of Messrs. Powell, the proprietors of several collieries in the district, engaged 40 or 50 men from Cardiff to work in the place of others who had struck. The latter engaged in large numbers at the Railway station for the purpose of intimidating the strangers as soon as they arrived; and the defendant, not content with hooting at them as the others did, picked up a large stone and threw it amongst them; it struck one of the men, named William Lewis. The solicitor for the prosecution said there was no doubt the case was one of common assault, but he thought the offence would come under a more serious denomination, and he, therefore, prosecuted under the "Combination Act." Evidence was taken of a criminal character, and the defendant was sentenced to one month's imprisonment, with hard labour. Mr. Fowler, the stipendiary magistrate, addressed him and the other colliers in court on the dangerous consequences of being concerned in such disturbances as that which gave rise to the charge. Any of the crowd, he said, was responsible for the throwing of the stone, for whoever took part in the object which the mob had in view—viz., the intimidation of the men, and preventing them going to work was responsible for whatever took place. He cautioned them against pursuing such a course, for although the law did not interfere with them so long as they acted peaceably, it would inevitably punish them when they tried intimidation on others, or failed to keep order. It is to be hoped this warning will not be without its effect on the obstinate men to whom it was addressed, though there is too much reason to fear that very few of them will suffer themselves to be guided by it. The atrocities committed during the last strike in the Aberdare Valley are still fresh in the recollection of the inhabitants, and not unreasonable fears have been entertained that similar scenes may occur now.

At the Monmouth County Court, on Monday, a case came on of interest to colliery proprietors. The plaintiff, Mr. Price, summoned Mr. Gibbons for the balance of a sum alleged to be due for work performed by contract at the Lydbrook Works, Forest of Dean. The statement of the plaintiff was, that he had agreed with the under-ground landlord to drive to a level at 31. 15s. per yard, and after completing this he received 7/- on account, and now claimed 43/- 6s. On the part of the defendant it was contended that no price was specified for the work—it was to be paid for as the ground turned out; and further, that the full value of the labour performed had been paid.

The manager of the Dowlaish Works, in the Forest of Dean, was called as a witness

for the defence, and stated that he had examined the work, and considered five yards

of it was not worth more than 21. 5s., the remainder might be worth 21. 10s. The

judge (Mr. J. M. Herbert) said he thought the evidence proved that no price was

agreed upon, and he gave a verdict for 30/- 3s., giving credit for what had been paid into Court.

An accident of a somewhat singular character has occurred this week at the Pant-y-lun balance pit, which belongs to the Cyfarthfa Iron Company. It appears that after the day's work was concluded all the men left, with the exception of a road-boy down with a light, and descended; and two others jumped into the bucket to accompany him. As they passed down the road-man came up, and the boys having unchained some empty tubs, gave the signal to return. A bucket was filled with water for the purpose of drawing them up, and during the ascent the water emptied over the head of the deceased, and knocked him out; he fell to the bottom of the pit and was killed. A verdict of "Accidental Death" was

THE TURBINE, OR IMPROVED HORIZONTAL WATER-WHEEL.

It is somewhat remarkable that, while in England the ordinary vertical water-wheel has been brought to as great perfection, perhaps, as it is capable of, almost total ignorance prevails regarding another form of wheel, which has been successfully used on the Continent for many years. The "Turbine" was originally invented in France by Fourneyron, but, under various modifications, it has spread into all the adjoining countries, and is now extensively employed, not only in France itself, but in Switzerland, Germany, Italy, and Russia. About ten years ago, the first turbine was introduced into Ireland, where the abundance and importance of water-power offered a fair field for the employment of any hydraulic machine which possessed advantages over those previously in use. Several engineering firms in that country directed their attention to the subject; and in particular, Messrs. MacAdam, of Belfast, after examining personally the working of many turbines on the Continent, and instituting experiments on the subject at home, commenced the manufacture on an extensive scale, and have continued it with remarkable success. We observe that, during the last year, they have erected several of them in mining districts on this side of the Channel; and as we learn that the results have been highly satisfactory, we have made further inquiries into the matter, believing it to be a subject of primary importance to all who have capital employed in mining.

The turbine, as perhaps our readers are already aware, is a horizontal water-wheel, of small dimensions, usually of cast-iron, furnished with curved buckets or float-boards, and revolving on an upright shaft. The water is introduced at the centre, either from above or below (according to circumstances), in a pipe; and, before entering the wheel, has to pass through a series of stationary curves or jet-pieces, which give it the proper direction necessary to produce the greatest amount of useful effect. The best curvature to be given, both to these stationary directing-jets and to the buckets of the wheel itself, is a delicate problem, on which much of the efficiency of the machine depends, but one which has now been completely solved in practice. In a well-constructed turbine, the water, after doing its work, issues out in a radial direction on all sides from the periphery of the revolving wheel, completely exhausted of its force.

The speed of the turbine varies according to the height of the fall, but is always much greater than that of a vertical water-wheel. Hence, in communicating its power to other machinery, none of the ponderous gearing and fixtures are necessary, which are indispensable with an ordinary water-wheel. The same observation applies to the masonry, which is of a far less expensive kind than is required for a vertical wheel. The machine itself, being of few parts, and of uniform and symmetrical construction, is not at all liable to go out of order.

While the vertical water-wheel is limited, in its application, to certain heights of fall, the turbine is applicable to any fall whatever. One of these machines is working in Switzerland on a fall of 332 feet; while another is erected in France on a fall of less than 2 feet. From Ireland, we have reports of turbines on a great variety of falls, from 6 to 80 feet.

One remarkable property of the turbine comes into play when it is applied to low falls liable to floods or back-water, and distinguishes it from every kind of vertical wheel. In such cases, an ordinary water-wheel, no matter how constructed, is soon obstructed in its action, and after a time, as the flood rises, it altogether stops; whereas the turbine is so little affected by back-water, that it continues its motion with regularity throughout all the period of the flood, only losing, of course, for the time, so much of its power as is caused by the diminished height and efficiency of the water. This curious fact is now well ascertained in Ireland, that the makers alluded to actually place their turbines intentionally immersed in the water of the tail-race, where they work always, thus utilizing every inch of the fall.

The question naturally arises—Does the turbine give as good a percentage of power from the same quantity of water, on a given fall, as a well-constructed vertical wheel? This important point has been established in the most satisfactory manner by numerous careful experiments on the turbines erected in Ireland by the makers already referred to. Not only are these wheels found to give as great, but a far greater, percentage of power than has ever yet been obtained from either the vertical wheel or the various forms of horizontal wheel hitherto introduced by inventors. From a variety of data on this subject, furnished by a disinterested practical man, we select an account of some experiments made near Newry, in the county of Down, as being conclusive as to the efficiency of the turbine.

The experiments were thus conducted:—The water was shut off from the turbine, and the entire works driven by the engine (two engines, 4 in. cylinder, 7 ft. stroke) at the regular speed. A set of diagrams were taken, and found to measure, mean—Engine A cy. top, 11.31 lbs.; ditto, bottom, 11.81 lbs.—Engine B cy. top, 11.87 lbs.; ditto, bottom, 14.08 lbs.—equal to an average pressure on one cylinder of 24.57 lbs. per square inch; and the area of the cylinder being 1257 square inches, the absolute indicated horse-power of the engines will be 314, nearly, to drive the whole works. The next half of the experiment was made by allowing the water to flow through the wheel, and cutting off the steam till the engines were driving at exactly the same speed as in the former half, when a new set of diagrams were taken and measured—A top, 7.32; bottom, 7.46—B top, 6.52; bottom, 8.00 = 14.65 lbs. per square inch absolute pressure on one cylinder, which, reduced to horse-power, is equal to 187½ horse-power, nearly, exerted by the engine when aided by the turbine. Now, 314 horse-power, minus 187½, leaves 127 horse-power as having been accomplished by the turbine; and allowing 2 horse-power for the extra friction of the engines when loaded, and 1 horse-power for the driving of the turbine without water, there still remains 124 horse-power as the power given out by the turbine.

The water consumed is derived from an artificial pond of large extent, in which the water is collected during the night, the top level generally sinking as the day advances. The greatest height of this fall is 48 feet, and at the time of making these experiments it was 47 ft. The quantity of water used was determined by rules founded on experiments made in Scotland some years ago, and which are given in every treatise on hydraulics. The actual effect produced by the turbine was 92 per cent. of the theoretical power, whilst 75 per cent. is considered a very good result for the best constructed vertical water-wheels.

Subsequent to these experiments, another (which, from its requiring no calculations, would be considered more practical by some) was made. The steam-engines were both disconnected from the machinery of the factory, and the turbine set to work by itself, in order to ascertain how much it would drive. Machine after machine was then attached, until the turbine was completely loaded, the quantity of water and all other circumstances remaining the same as in the experiments already described. The result was equally satisfactory. The amount of power expended was easily ascertained in this case, because the machines of a spinning-mill are repeated of each other.

Finally, a comparative experiment was made to ascertain the difference between the power of the turbine and that of a horizontal water-wheel of another kind, which had been erected previously on the same fall. This was a "Whitelaw and Stirrat's patent water-mill," and it was to replace it that the turbine was erected. Before removing the water-mill, it was tested in exactly the same way, and by the same parties who afterwards tested the turbine; and the conducting pipes and connections were left in precisely the same condition for receiving the turbine. In a word, the one machine was merely removed, and the other fixed in its place. The result was very remarkable—the water-mill gave 61 per cent., and the turbine 92 per cent.

DRESSING ORES.—Mr. John Westlake, Holston, provisionally specified some improvements in cleaning, separating, and dressing ores of pulverized tin, copper, lead, silver, and other minerals. The invention consists of combining certain apparatuses or machines in order to separate, clean, and dress pulverized ores of tin and other minerals and substances, and consists, first, of an apparatus, which he calls a separator, of any proposed dimensions or shape, made of wood or iron, into which the tin or other mineral flows, with a proper quantity of water from the stamp or other pulverizing machine into the first division of the separator; the heavy particles fall to the bottom, which is a V-shaped or inverted cone, to prevent any lodgment of stuff, and is let off by a sliding door at the bottom, and the fine and light particles pass on to the second division in an ascending or upward direction, and in this manner the water and ores pass on from one compartment of the separator to the other, until the finest portion of the ore in solution is discharged into the second apparatus, which he calls the slime dresser, and consists of two or more vessels or cisterns, made of wood or other suitable material, in the shape of an inverted cone. One cistern is placed within the other, and as the ore in solution reaches the bottom edge of the inner cistern, it ascends or passes upward through an opening which is preserved between the two cisterns, and as the ore in solution is in the act of ascending, the heavy particles fall to the bottom, by reason of their greater specific gravity, and the foul water and slime flow over the edge of the outer cistern, and are carried off by a waste shoot. He uses any number of these double cisterns, required to clean the different

descriptions of minerals, by passing the ores in solution from one pair of cisterns to another, and repeating the operation until the requisite cleaning and dressing is obtained. The heavy portions of the ores, which are drawn off from the bottom of the separator by sliding stop doors, are carried into one or more vibrating bobbins, which are made of wood or iron of any required dimensions, and are suspended by iron hoops or short chains on sharpened edges of iron, and one of the bobbins is made to rise or fall by screws, so as to adjust the bobbin to a required inclined plane, and the bobbin is kept in a state of vibration or shaking motion, by working a short crank, to which is attached an iron rod, which strikes against the bobbin as the crank works; and the bobbin being hung upon the sharpened edges of iron bars, the continuous striking of the iron rod maintains the required vibrating motion, which causes the tin or other heavy substances to seek the bottom of the bobbin, while the sand and waste are carried off by the flowing of the water over the end, which is fitted so as to be raised or lowered by an iron rack or other convenient method. He occasionally uses a permanent filter for the purpose of separating the slime and tin or other minerals from the foul water, and for obtaining a supply of cleansed water. The filter is made of wood or iron, of any dimensions, and divided into two or more compartments; the foul water is let into one part, and is made to pass over the sand, shot, charcoal, sawdust, or other filtering medium, and the water seeks its level by rising upward through the sand or other medium, and the slime falls to the bottom, which is bevelled diagonally, to prevent any accumulation, and are let off at a plug hole when necessary. The sand or other medium is placed on a perforated metal plate about the middle of the filter, and on the upper part a shoot is fitted with stop doors, and turns the water from one compartment to another, for the purpose of cleansing each part when required.

THE AIR-ENGINE.—That Goodlet's air-engine is capable of practical application has now been fully proved, one man being enabled to compress the air and work 14 ears, by which a small vessel is propelled with the greatest ease; yet there appears no disposition on the part of the engineers to render the invention any assistance; for Mr. Goodlet writes that he has not been favoured with a call from any of the engineers since the invention was matured and in operation, and, however, valuable the discovery they seem resolved not to countenance it. That the proprietors of steam-vessels should view with jealousy the invention he was prepared for, but he certainly did not look for so powerful an opposition from the engineers, for although their profits at first will be considerably diminished, their business in the long run will be benefited, and were they bold and fearless, like honest men, to acknowledge the importance of the discovery, they would have at least 50 vessels to apply the patented mode of propulsion for one at present. It is needless for us to discuss the merits of the invention, as full descriptions have already appeared, but we refer our readers to an advertisement in another column.

GOLD AMALGAMATORS.—There have been several machines invented for the purpose of reducing and amalgamating ore; wonderful results, it is stated, have been achieved by some, and although flattering reports have been published from time to time, yet unfortunately nothing practical has been performed by them. About two months since we directed attention to the invention of Mr. R. Goulding; this gentleman, who has resided some time in Australia, after considerable research and many experiments, succeeded in perfecting a machine whereby the whole of the gold could be obtained, and the mercury used in the amalgamation saved. Lately further improvements have been made; there are now a less number of fans, a double pipe can be used, so that the amalgamation can be effected in a shorter period than heretofore. Five of these machines have been already shipped to Australia, and three have been ordered by an eminent firm there.

LOCOMOTIVE APPARATUS.—Mr. R. A. Brooman, patent agent, Fleet-street, has patented an improved locomotive, which consists of a carriage carrying steam engines on a railway, in the shape of two large wheels, one on each side of the carriage. The wheels are formed with a groove on the inside, and across the groove there are fitted at regular distances projections or bars, so as to form an endless circular rack. The propelling power is imparted through a wheel on each side of the carriage, fitted with teeth or cogs, which take into the spaces on the endless rack. By means of a screw arrangement, the weight of the carriage may be thrown forward or backward on the rails to suit any rise or fall in the road.

ARTIFICIAL STONE.—Mr. J. Ellis, of Port Hope, Canada, has patented an invention for the manufacture of artificial stone, which consists in combining or cementing together pulverized stone, brick, earth, and other materials. The chief cementing materials employed are lime and silicate of soda or potash, or both.

SILVERING.—Mr. J. P. Becker, Paris, has invented some improvements in the mode of silvering animal, vegetable, and mineral objects. The silvering is effected by bringing the objects in contact with a fluid composition possessing the quality of acting electro-chemically. This fluid is formed of metallic or vegetable acids, mixed with water and a solution of silver, adding thereto, according to the natures of the objects to be silvered, and of the basic to be changed, alkalis, grape or milk sugar, chlorine, fluorine, potassium, calcium, sodium, metallic oxides, and essential oils. The articles must be well cleaned and freed from obstructing matter by washing and soaking them generally in alcohol, a wash of potassium, cyanide of potassium, or salt of sumac. The solid objects are placed horizontally, and the fluid poured on them, where prompt action is required and sufficient heat is applied underneath. The electro-chemical action begins in about ten minutes, and the silvering is completed in about half an hour. The soft objects are dipped in this fluid, and are exposed to a suitable heat until the silvering is finished, varying from a quarter of an hour in some to several hours in others. The process can be effected with a result nearly the same, if the application should be applied without the aid of heat, but much more time would be required.

MANUFACTURE OF GAS.—Mr. John Peak, of Wigan, to manufacture gas from tar, resin, or the products derived therefrom by distillation, either of these products alone, or with the addition of water or steam, proposes to drop the said products into a retort filled with charcoal, or other suitable substance, from which it passes in a state of decomposition into another retort, or division of the same retort, and passes it thence into the hydraulic main direct to the gasometer.

ELECTRIC TELEGRAPH.—Mr. R. S. Newall, Gateshead, to overcome the difficulty usually met with in getting rid of the charge, proposes to render the strand smooth and uniform by filling the interstices with tin or other suitable metal, as he finds the difficulty increases in proportion to the surface exposed to the insulating substance.

IMPROVEMENTS IN STEAM-ENGINES.—Mr. W. H. James, C.E., has invented and patented some improvements in steam-engines, whereby he states that he is enabled to effect a saving of at least 50 per cent. in the prime cost; 50 per cent. in the time for manufacture; 50 per cent. in weight; 50 per cent. in space; 50 per cent. in the time in getting up steam; 50 per cent. in the water in boiler; and from 50 to 50 per cent. in fuel. He generates steam by forcing and circulating water through a long length of very strong small tube, coiled or corrugated into interstitial masses, or through cellular-formed vessels, exposed to the immediate heat of the fire, in suitable furnaces, by double-acting force-pump, actuated by the machinery of such engines, in combination with certain means of separating the water from the high-pressure steam so generated, and of storing up a sufficient quantity of each in receivers and reservoirs of a tubular or cellular structure. He condenses high-pressure steam by the application, injection, or admixture of a portion of water derived from the steam-generating apparatus itself, after having been sufficiently refrigerated for that purpose whilst passing from thence under pressure through a long length of very small tubing, exposed to the action of cold water, or of currents of cold air passing to the fire, or otherwise produced; the water after having been used for condensing is forced back to the generator. He entirely remedies the injurious action of the very high-pressure steam upon the packing of the piston, &c. The engines are applicable for locomotive, marine, stationary, and agricultural purposes, and may also be used as fire-engines, portable-engines, or for propelling carriages on common roads. The advantages to be derived from their use are very great in every instance.

HYDRAULIC MOTOR.—M. de Fontaine-Moreau has patented an apparatus composed of a number of hollow elastic buckets or bellows, partly immersed in water, made to pass over two pulleys. Each bellows is furnished with a leaden weight at the bottom, which forces the air contained in the bellows on one side, to pass by means of elastic connection tubes into the buckets or bellows which are on the opposite side. The bellows are fitted to slotted links, and connected together so as to form an endless chain which passes over the two pulleys.

CHEMICAL COMPOUND.—Mr. W. W. Bonney, Fulham, provisionally specified a substitute for Argol tartar and tartaric acid. He first prepares stannic chlorides (*chlorure stannique*) by mixing in or about the following proportions:—1½ oz. of bay salt or sea salt, 8½ lbs. of muriatic acid, 2½ lbs. of nitric acid, and by dissolving tin in the liquid thus obtained, adding the metal a little at a time, in order that the solution may proceed slowly, and continue for at least a day. He then manufactures the composition to be used as a substitute for tartar by dissolving 6½ lbs. of oxalic acid in about 66 lbs. of hot water, and about 6½ lbs. of stannic chloride in about 66 lbs. of cold water. He stirs for about a quarter of an hour, then adds about 13½ lbs. of sulphuric acid, stirs again for about a quarter of an hour, and when the two solutions are quite cold he mixes them together, and leaves them to settle for about 24 hours before using.

RAILS.—Mr. A. FitzGibbon, of Canada, proposes, in place of rolling or forming the lower or bearing flanges of rails with parallel sides, and making holes through such parallel flanges as heretofore, to form the lower or bearing flanges of the rail with projecting lugs at intervals, through which the necessary holes are made to receive the fastening down such rail.

MANUFACTURE OF TILES.—Mr. C. Pascoli, Norwood, proposes to cut off the tile material in proper lengths, and at the same time shape the tile end by means of two wires suitably stretched between two slides, which traverse across the breadth of the tile in guides, which cause the wires to traverse, so as to describe and cut the ends of the tile of the proper form.

MACHINERY FOR DRIVING PILES.—Messrs. Simons and White, of Kingston-upon-Hull, have provisionally specified an improved arrangement of machinery for driving piles where steam is used as a motive power. They attach to an ordinary pile-driving machine a steam winch, worked with one or two cylinders, attached to the raking part of the winch frame and to a spiked winding barrel. A flat linked chain revolves round the said spiked winding barrel and a spiked wheel at the top of the pile frame. In order to lift the monkey or hammer a pair of nippers are attached to the horns of the hammer, which clip a hook into the chain while in motion, and carry up the hammer, and these nippers or catches may be struck off at any height either by hand or by self-acting machinery, in order to disengage the hammer. The invention also comprises the use of a common instead of a flat linked chain, working in grooved sheaves on the winding barrel and on the top of the frame, and by an eccentric and wedges is made to press against the back of the hammer and thus raise it. The base of the framework of the machine is placed on wheels, so as to move easily in any required direction, and turns on a centre pin or axle, so as to bring the frame to any desired angle. The invention also comprises an arrangement for pitch the pile by a common chain working over a sheave fixed on the top of the pile frame, and attached to the head of the pile and the endless chain, on which, the motion being reversed, the pile is drawn up. Steam may be supplied from a boiler at a distance, or from a portable one attached to the machine.

MANUFACTURE OF ENVELOPES.—A very ingenious little machine for the manufacture of envelopes (Keith's patent) is now in constant use at Mr. Gathercole's, Dorset-street. The prime cost is said to be less than that of any other, it is less liable to get out of order, it gums the flaps more securely, by a longer line of gum, and requires but one stroke of the plunger to make an envelope, all others requiring two. As many as 100 per minute have been made.

* * * TAPPING'S PRIZE ESSAY ON THE COST-BOOK SYSTEM, enlarged and augmented, with Notes and an Appendix, can be had at the MINING JOURNAL office, 26, Fleet-street.—Price 5s.

STATE OF THE SOUTH STAFFORDSHIRE COLLIERY DISTRICT.

The notice for the reduction of the wages of the thin-coal colliers, in and round Bilston, Sedgley, Willenhall, Portobello, and the neighbourhood, expired on Saturday. Considerable apprehension prevailed that some disturbances would take place on the occasion. On Friday a very uneasy feeling prevailed in Bilston, and some of the colliers held out threats to the effect that if what they considered their just demands were withheld they would resort to violence for the enforcement of their "rights." In consequence of these threatening appearances the magistrates placed themselves in communication with Major M'Knight, the Deputy Chief Constable of the county, in command in the district, and that officer on Saturday reinforced the stationary police force by a strong auxiliary body whom he introduced into the town. Large bodies of colliers wandered about the streets in the evening, and were guilty of a few practical jokes, but refrained from any serious act of violence. Sunday also passed off quietly; and on Monday morning most of the men, as was expected, abstained from going to work, pending the result of the interview with their employers, fixed by them to take place at Wolverhampton on that day. At some of the pits the men continued at work under an understanding that if other masters agreed to maintain the present rate of wages their employers would concur in the same arrangement. Amongst these were the men employed at Lord Ward's pits on the Sedgley side; Messrs. Bagshaw's, Messrs. Hickman's, and some of Messrs. Baldwin's men; but the greater portion of the colliers employed in the district remained idle. The Willenhall and Portobello men alone have called meetings, and passed formal resolutions, and by them the deputations who had the conference with Mr. Philip Williams and Mr. Hartley in this town, on Monday, was appointed. The police say the demeanour of the men towards them has exhibited a marked contrast to the feelings displayed at the last turn-out.

On Tuesday morning numerous groups of the turn-outs lounged about the streets at Bilston and Willenhall, and some fears were entertained that ere the close of the day disturbances might be attempted. But such does not appear to have been the case of the men. About midday they began to congregate at Willenhall, where a meeting took place in a club room, in Hall-street, to enable the deputation who had waited upon the ironmasters at Wolverhampton on the previous day to report to the men the result of their interview. Wm. Caswell was in the chair. Wm. Dodd, one of the deputations, read a report of what took place between the deputation and Messrs. Williams and Hartley and the Earl of Dartmouth, on Monday. The chairman then recommended the miners under the circumstances to return to work. Iron, he said, had been reduced in price, and the miners must submit to occurrences. The masters had met the deputation fairly, and had promised that if their men laboured under any grievance, they would try to redress it. A miner, named Platt, moved the appointment of a committee who should sit permanently and receive all complaints from their fellow-workmen; that a room should be taken where the newspapers could be read, and the price of iron and the value of labour ascertained; and that if the masters attempted to reduce them until a reduction took place in the price of iron they should strike. The meeting seemed disposed to meet the masters fairly; but wished to have the opportunity of knowing at all times when wages might be expected to be reduced, and when they might fairly demand higher wages. The motion was adopted, and 13 colliers were nominated members of the committee. A second resolution was passed that the miners should quietly return to work. A vote of thanks having been passed to the deputation and also to the masters, the meeting separated. It may, therefore, be presumed that the threatened "strike" is at an end; and, for the sake of the men, as well as the welfare of the district, we rejoice that it is so. Feeling satisfied that, if in the present state of affairs, they had determined on "standing out," it is called, they would have had to endure much suffering, without in any way improving their position.

There has been but little change in the state of the iron trade during the last week: some of the first houses are fairly off for orders, but, generally speaking, things are quiet, and the mills and forges in the district are working short time. Pig-iron rules fall, and good pigs may be bought at 31s. 6d. per ton, but purchasers are very careful, thinking they may ultimately be bought lower. Furnace men generally have been reduced in their wages, but puddlers have not, as yet, been materially interfered with. Stocks of pig-iron are increasing, notwithstanding the number of furnaces put out of blast since quarter-day are about fifty, and others will follow. The prospects in America are becoming more cheering and some orders of an important character have lately come in from thence. The notices of the thin-coal colliers and stone-getters west of Dudley expired on Saturday evening last, and in several instances the men are ordered to go on at the old rate of wages—3s. 6d. per day. A number of the large proprietors of mines have not given notice to their men, and state that the subject might have been fully discussed before any steps were taken. This not being the case, there is reason to believe that those who have given notice to their men in these districts will order them to go on for the present at their old rate of wages. Ironstone, the yield of the district, has very much fallen off as it regards the demand, and prices are considerably lower; the present quotations are 16s. per ton. The red hematite and other ores brought from a distance into these districts have greatly fallen off, arising from the suspension of furnace operations, combined with a want of confidence on the part of the persons selling them. —*Wolverhampton Chron.*

SAFETY LAMPS.—Mr. W. Pratt, of Baltimore, U.S., has patented some improvements in safety-lamps. He claims protecting the orifices of vessels used in holding, pouring, and burning inflammable liquids with a valve of ribbed metal, wound upon itself, or made of strips of plain and corrugated metal wound together, these, so formed, making most economically a series of regular tubes, of great stability and conducting power, together with freedom of pouring through them the liquids, and also presenting great facility of cleaning from any accidental obstructions. He also claims the arrangement of the feeder tube and cap, and the wick tubes and cap, either by the intersection of their peripheries

PHOTOGRAPHS FROM MANUFACTURING DISTRICTS.—No. VIII.

BARRON STEEL, IRON AND CARRIAGE SPRINGS.—When it is remembered that there are thousands of miles of railway lines, and millions of different kinds of carriages supplied with springs, almost entirely from British sources, a magnitude and responsibility is at once attached to this branch of manufacture. Its importance does not simply consist in the vast amount of treasure necessarily invested, the inconceivable number of persons furnished with employment, and the wonderful accumulation of profits arising from the several processes unavoidably existing; but, at the same time, the public convenience and safety should be distinctly recognised. It is of small consequence if the mechanic breaks a file, or the carpenter a saw, but if an axel or a spring should suddenly give way, lives and limbs are in immediate jeopardy. The royal chariot, the Lord Mayor's carriage, the nobleman's phaeton, the gentleman's brougham, the tradesman's trap, the carrier's cart, and the costermonger's barrow, are all supplied with springs, and these are all made of steel. The private and public conveniences arising from the general application of springs to carriages are far more numerous than it is necessary to mention, but we all know the advantages experienced in travelling, and the benefits of articles of value being transferred from place to place without the injury that must have been sustained had we not possessed those facilities which springs impart to all kinds of conveyances. It must be admitted that construction is of importance, but the kind of steel used is of primary consequence; the quality of the material which should be used for carriage-springs should be distinguished for fibre, hardness, and elasticity. Sometime ago, the iron in general use for springs was CUND, or of a similar class; its price averaged 16s. per ton. The converting character was called a low heat, the bars being laid with less charcoal, exposed to less heat, and drawn in less time than those required for melting purposes. This description of steel was sometimes "loose," but the process of rolling prevented that from being much observed in lengths required for carriage-springs, but it was distinguished for fibre or toughness, which recommended it very highly to the workman, and must render it serviceable and satisfactory to the consumer; the length of time it would last, and the security it would afford, were some reparation for the extra outlay involved in the original purchase. Possibly no metal is more deceptive in its porous appearance than steel. You may break a bar of common steel, and it will sometimes have an appearance much resembling that of cast-steel; you may break another of the same quality with very opposite results; the fibre of the substance cannot be correctly observed in the grain of the bar, but let it be submitted to the hammer its character is immediately discovered; it yields to the operation, and is fashioned with ease to the will of the workman: this quality is generally designated "working well." The fact is, the material has been well puddled, the sulphur and earthy particles removed, and the substance rendered thoroughly available for the purposes of manufacture.

Dr. Livingstone has given a strange revelation in the iron business, by stating that the natives of the interior of Africa use the iron which they take from the earth without the processes known to us as essential for rendering it useful. That iron he describes as possessing all the features of our superior wrought material. The circumstances he mentions appear to admit of no doubt, and the veracity of his testimony none would question; such a treasure must be worth discovery, and the consequences of its application would be of the highest importance to a commercial nation like that of Great Britain. It is an experimental fact, that iron destitute of fibre will resist the labour of the mechanic; it will crack and break, and will not draw to the length or point required, in the manufacture of springs, though in them there is much less labour than there would be were it not for the perfection to which rolling mills have now been brought. The exact breadth and thickness is produced with unerring accuracy; and though iron and steel expand when hot, the experienced roller can calculate to the greatest nicety the gauge of the bars when they shall have become cold.

Hardness.—An uniformity of temper, is desirable in the steel used for the manufacture of carriage springs. Great quantities of iron are spoiled in the converting: the laying in of the bars is of great importance, but the management of the heat is of no less consequence. Proof bars are a good criterion of what is going on, but they are not all. The constant watching and firing for seven or more days and nights is a kind of endurance which few men can support; and some who are left to the night charge may be inefficient or careless; a variation in one bar may ruin several sets of springs, and may produce very important results in the loss of labour, or the destruction of the manufacturer's credit. Let no one be hasty in their censure on manufacturers for the articles which bear their names; they are in the hands of working men, who may be neither dishonest nor malicious, but neglect, ignorance, or inobriety, at a time when it is impossible for the principal's eye to be upon them, may be attended with evils which the manufacturer most deeply regrets. It is not the business of the writer of this Photograph to discuss the benefits of general education, but an enlightened, sober, and industrious body of working men would be the greatest boon which the manufacturing community could possess.

The examination of steel when it is drawn from the converting furnace is principally directed by the blisters which appear on the surface of the bars. In a low heat, such as is suitable for carriage-springs, these should be small but regular, which denotes an uniformity in the temper of the material; should that be wanting, a few feet of bar steel being rolled into as many yards of springs may be injurious to an extent better conceived than described.

Elasticity.—Thickness of material must be regulated by the pressure which will be applied. The same strength is not needed for a family carriage as must be necessary for a luggage-van. The thinner the material the more elasticity, if the skill of the workman be exercised in the construction and hardening of the article; but there is steel which will sooner break than bend, and there is material which will bend and never recover its former position. Such substances cannot answer the purposes of public convenience, comfort, or safety; and to such articles as are made from it may be attributed the shaking and the weary bones of which third-class passengers on our railways so frequently complain.

As a very reasonable consequence, those who are interested in the steel trade will manufacture carriage springs: large consumption of material is a source of profit they must entertain; and as they cannot all appear in Photograph, let one or two suffice as types of the remainder in the town of Sheffield. Messrs. Burgin and Wells, in Holli's Croft, are manufacturers of carriage springs, &c. About ten years ago they commenced the steel business, and planted very powerful and efficient machinery for rolling steel and iron. This is one of the greatest facilities manufacturers can possess, and they have that on a scale of completeness which few houses can boast. They have exhibited a great amount of perseverance and tradesman-like skill, and their success seems constantly more evident.

Mr. John Brown has entered largely into the spring business; he has exhibited a vast amount of energy, industry, talent, and experience; his trade has gradually expanded, and his position in the spring-making department is of a very praiseworthy description. British steel iron is now generally used for carriage springs, and, at little more than half the cost of foreign iron, answers every purpose. The truth is, that kind of manufacture is rapidly improving; every day seems to make additions to the resources of Great Britain; and as iron, intrinsically, is more valuable than gold, the mines of England may vie with the wealth of the Indies or the diggings in Australia. There are, undoubtedly, numerous means yet to be employed for increasing the value of British iron; the only danger is that of so far abridging necessary manual operations as to render it unfit for useful purposes, and thereby lowering its character and value in the esteem of our customers at home, and in all other parts of the world. Yet it is satisfactory to recollect that there is abundance of practical skill deposited in manufacturing circles, which will determine the utility or uselessness of any substance introduced through a new name or patent. Let any new material be subjected to experimental test—let it come into the hands of practical tradesmen and experienced workmen, and its ordeal will be such as, if it creditably passes that bar, the public may then receive it with confidence and safety.

It is worthy of observation, that no sinister motive has been displayed by any one who has yet offered a new discovery in the iron trade; their object uniformly appears to be patriotic and business-like, and whatever private benefit may arise from their inventions or improvements, the public advantage will be considerably greater. Cheapness, when it is associated with good quality, is no sectarian acquisition; it is diffused through the system of commerce, and becomes the public right of all classes; and there is very little reason to fear the detection of anything of a spurious kind in this age of application and enquiry. The influence of an unfettered press, the intelligence which characterises every grade of society, the practical skill of workmen, the disinterestedness of the great

body of merchants and tradesmen, and, above all, the very laudable desire to preserve the good name of all British productions, is a sufficient guarantee for the injection of any material which would not be a substantial acquisition to our commercial resources.—JOHN BENNETT.

THE PATENT LAW, AS RECENTLY AMENDED.—No. VI.

BY F. W. CLAPIN.

AMENDMENT BY DISCLAIMER, OR MEMORANDUM OF ALTERATION.—As the law rigidly requires an exact compliance with its provisions as to the specification, and as default in complying therewith will destroy the patent right, it becomes important to know if an unfortunate inadvertence can in any way be rectified. In former times there was no possibility of doing this, and the specification as originally enrolled remained for ever incurable; but now, by Lord Brougham's Act of 1853 (referred to under the head of Novelty), and by the Act of 1852, a patentee may apply at the office of the Commissioners of Patents to be allowed to enter a disclaimer, or memorandum of alteration, and then, with the leave of the law officer to whom the same is referred, he may enter such disclaimer, or memorandum of alteration, wholly cancelling some part of the title (provisional specification, *quæsita*) or specification (complete or final), adding words, if need be, "provided, however" (to the words of the Act), "be it remembered that such alteration, or disclaimer, shall not extend the exclusive right granted by the said letters patent"—i. e., that which is by the general tenor of the language of the original documents positively excluded from the scope of the invention cannot be included by the aid of a disclaimer, or memorandum of alteration, subsequently filed.

To be allowed to disclaimer or alter, application in writing must be made at the Commissioner's Office, setting forth the nature of the disclaimer, or alteration proposed, and the reasons for applying for it. This application will be referred to the law officer (who will, if he thinks fit, order notice of the application to be advertised in the public papers, in accordance with the Act of 1835). The law officer will then appoint a day for hearing the applicant on the subject, and any party who may have entered a caveat will be allowed to attend and oppose. If the law officer allows the application, then the document has to be filed in the Patent Office, and henceforth the patent right will consist in what is not cut away. But it will be seen that it is specially provided by the Act of 1852 that no action will be allowed to be brought for any infringement committed prior to the disclaimer or alteration, unless the law officer certifies that it may be brought, and then, of course, it may possibly not be successful.

Although the law has thus given power to disclaim, it must be borne in mind that the right to do so is dependent upon the law officer's opinion of the case, and that if he allows the disclaimer, or memorandum of alteration, to be entered, it does not always follow that the defects of the patent are thereby cured, for in the case of *Tetley v. Easton*, the patentee brought an action, and being defeated entered a disclaimer, then brought a second action, and was again defeated.

Independent of this statutory provision as to amendments, the Lord Chancellor and Master of the Rolls have the power in certain cases to admit of no doubt, and the veracity of his testimony none would question; such a treasure must be worth discovery, and the consequences of its application would be of the highest importance to a commercial nation like that of Great Britain. It is an experimental fact, that iron destitute of fibre will resist the labour of the mechanic; it will crack and break, and will not draw to the length or point required, in the manufacture of springs, though in them there is much less labour than there would be were it not for the perfection to which rolling mills have now been brought.

Patent Office, Strand, Dec., 1857.

ORIGINATOR OF THE MODERN RAILWAY SYSTEM.—No. III.

The late Mr. W. James possessed extensive coal mines in Staffordshire, Warwickshire, and Derbyshire, as well as iron and lime works, and was deeply interested in the Stratford-upon-Avon Canal and River Avon Navigation as far as Tewkesbury; and, about the year 1810, obtained a long lease of an extensive tract of land at Newhall Hill, situated very centrally in Birmingham—the greater portion of this hill he removed, at an immense expense, and upon its site formed a series of wharves, which he connected by means of a short branch of canal with the Birmingham and Fazeley Canal. His real and ultimate object, however, being to run a main central railroad through a short tunnel under the remainder of the hill, and thence through the very heart of the Staffordshire coal field, connecting it in its progress, by means of a perfect network of short railroads, with the adjacent towns of Dudley, Stourbridge, Wednesbury, Bilston, Walsall, &c., and all the principal collieries and ironworks of that district, with a view of breaking up the very powerful monopoly of the Birmingham Canal Company, with which he had been long at variance.

Finding, however, that no machinery on canals was likely to produce the velocity of transit which he never doubted to be attainable on railways, Mr. James directed all his attention to the application of locomotive engine-power thereto, and in 1819 and 1820 surveyed and made sections of three distinct lines of railway between Stratford-upon-Avon and Moreton-in-Marsh, suitable for the employment of locomotive engines, which he completed in 1821. At the very same time as Mr. James was engaged in these surveys he had another staff of surveyors at work surveying, levelling, and planning his more important line of railroad between Liverpool and Manchester, upon which line he had fully made up his mind to introduce the locomotive engine system of transit for goods and passengers; and having, during its progress, viewed the engine of Blackett and Stephenson, he at once decided upon paying a visit to Newcastle, to see the engines of Blackett and Stephenson. About which period he entered into the following agreement with Messrs. Losh and Stephenson:

Know all men by these presents that we, William Losh, of the town and county of Newcastle-upon-Tyne, ironfounder, and George Stephenson, of Killingworth, in the county of Northumberland, engineer, in consideration of £1,000 of lawful money to us, paid at or before the sealing and delivery of these presents, and in cons'ns of William James, Esq., of West Bromwich, in the county of Stafford, miner and engineer, giving his recommendation and best assistance for the using and employing the locomotive engines for which we, William Losh and George Stephenson, have obtained two letters patent, on such terms as we shall by writing direct and appoint. We, the said Losh and Stephenson, have granted and assigned, and by these presents do grant and assign unto the said William James, his heirs, adm'rs, and assigns, one-fourth part or share of our rights and patents in the exclusive use of the locomotive engine for working on railroads, secured to us by certain Acts of letters patent of his late Majesty, and of the profits arising from the granting the use thereof to any other party or persons whomsoever—such fourth part or share of the use, right, interest, and profits to be confined to engines made, used, and sold in that part of England and Wales lying south of a line drawn from the town of Liverpool to the town of Hull; to have and to hold such fourth part or share of the said patent right and profits from the date hereof unto the said William James during the term of the said letters patent. Given under our hands and seals Sept. 1, 1821.—Wm. Losh; Geo. Stephenson. And in consideration of such grant of one-fourth share in their patent, William James agrees to allow the said William Losh and George Stephenson to adopt any improvements and the introduction of tubes to their boilers, as contained in the letters patent of William Henry James, son of the said Wm. James, as granted to him in the reign of his present Majesty.—Wm. HENRY JAMES; WM. JAMES. (Signed Sept. 1, 1821.)

A letter from Mr. Walker, dated Oct., 1821, states that, according to Mr. James's request, he had past a copy of the advertisement notice of the railroad to the Forest of Dean on the Shire Hall door. Amongst the documents there is also a most elaborate report and estimate, dated April, 1822, of a line of engine railroad from Bishops Stortford to Clayheth Suike, below Cambridge, with a branch to Waddon. Next comes a letter from Mr. James to Mr. Losh, of Losh, Bell, and Wilson, of Newcastle-on-Tyne, dated June 11, 1822, urging that he might be at once supplied with a locomotive for the Croydon Railway, for which he would himself defray every expense; adding that years might elapse, and the patent expire, before a new road could be obtained in the South to suit Mr. Stephenson's engine, and that he wished Mr. Stephenson to consider the best form of engine-power and carriage for the conveyance of passengers and light goods with the utmost despatch between the towns of Liverpool and Manchester, where he considered four lines of railroad would be advisable, or in any case three. The whole of the surveys and plans of which were then completed. After a series of letters, referring to the duplicity of Padley and George Stephenson, there is one dated August 4, 1824, in which, writing to his son, Mr. W. H. James, he says he sadly wants his aid, or must get other assistants to proceed with his surveys for the next year's Parliament. He purposed to bring forward the Birmingham Union Railroad to Wolverhampton, Walsall, Dudley, and Stourbridge; the central junction from Moreton to Oxford and Lethiade; the Canterbury, from Whitstable to Sandwich, or Folkestone; the Liverpool and Manchester, and the Corinth Junction from Padstow to Fowey. He would then have four or five others of great importance.

Mr. James projected and surveyed many other important railroads, both before and after this period. As the whole of the preceding projects, surveys, &c., were completed and recognised before Geo. Stephenson had anything whatever to do with the Liverpool and Manchester Railway, and even before he was known as a railway engineer, in the general acceptance of that title, it remains for the public to form its own opinion as to whose exertions and pecuniary sacrifices it stands indebted for the introduction and establishment of our Modern Railway System.

EUPHRATES VERSUS SUZ.—The recent attack upon Mr. Andrew, the Chairman of the Euphrates Valley Railway Company, in an article on the Suez and Euphrates routes to India, published in the *Quarterly Review*, has been ably met by "A Barrister," in a pamphlet issued through Ellingham Wilson. The quarterly reviewer says that the numerous towns alluded to in the prospectus of the proposed Euphrates Valley Railway Company, with the exception of Bagdad and Mosul, on the Tigris, exist only in the imagination of Mr. Andrew, or are mere Arab settlements, too poor to maintain even the smallest trade. The fact of the matter, however, is that the only towns mentioned in the prospectus are—Antioch, Aleppo, Anah, Hitt, Hish, Kurnab, and Bussorah, which possess a population of 133,000, so that there can be no doubt that Mr. Andrew was justified in his statements. The Indian trade to Mesopotamia alone approached 2,000,000, as far back as 1851, and Sir John Macneill, in his late surveying expedition, met, in one day, 1452 laden animals between Suedia and Antioch; and on an average 1200 camels and horses pass the Jezir Hadid daily from Aleppo and Killis. The entire pamphlet is equally opposed to the views of the "Reviewer," and as the "Barrister" has made no assertion without giving ample proof of its correctness, whilst the "Reviewer's" are simple statements, not only at variance with fact, but which evince an utter ignorance both of what has been done and what is being done, we may leave our readers to judge as to the relative value of the assertion and the refutation.

WHEAL POWELL, IN THE PARISH OF KENWYN, NEAR TRURO. VALUABLE MACHINERY AND MATERIALS FOR SALE.

MESSRS. WARE AND SON WILL SELL, BY AUCTION, on Wednesday, the 6th day of January, 1858, at Eleven o'clock in the forenoon, the WHOLE of the MACHINERY and WORKING PLANT on the above mine, comprising an excellent 30 in. cylinder STEAM-ENGINE, 8 ft. stroke in cylinder, and 6 ft. in shaft, and boiler about 10 tons; shears and sheaves, complete; 8-in. capsitan; about 44 ms. of 9, 10, and 11 in. pumps, with dooperies, working-bars, and windbores; 30 ms. of 1½ in. bucket-rods; horses-whim, with shaft tackle and windbores; 30 ms. of 1½ in. bucket-rods; horses-whim; 30 ms. of 1½ in. chain; excellent double power crab winch; 40 ms. iron stave ladders, nearly new; one piece of 9 in. main rod, 68 ft. long, and one piece of 6 in. main rod, 35 ft. long; whim kibbles, air pipes, sile pipes, barrel of tar, powder, 30 in. smiths' bellows, carpenters and smiths' tools, old iron and rope, barrows, new and old timber, with several lots of account-house furniture, &c. The auctioneers beg respectfully to invite punctual attendance, as they purpose selling the whole in one day. Catalogues will be ready one week prior to sale. Dated Paris-street, Exeter, Dec. 23, 1857.

SOUTH WALES.—Mr. ARTHUR O. DAVIES, of Dowlais, is authorized to TREAT for the SALE of TWO VERY VALUABLE COAL COLLIERIES in South Wales.

Also, TO LET, an EXTENSIVE TRACT of STEAM COAL, on a long lease, at a moderate royalty, with a railway running through the property.

For terms, apply as above.

MINERAL DISCOVERY.—TO LET, a LARGE DEPOSIT of SPATHOSE, HEMATITE, and OXIDES, and a COPPER DEPOSIT of PURPLE, GREEN, and YELLOW CARBONATE, and NICKEL, all laid open by mountain torrents, easy of access, and all down hill. Freight to Glasgow, 2s. 6d. per ton. Only four hours' sail to Greenock, by daily steamers. Apply to the proprietor, W. FORLONG, Esq., of Erins, near Tarbert, Loch Fyne, Argyleshire.

To BE LET, EXTENSIVE ROYALTIES OF COAL, amounting to 1000 acres, to which more may be added, if requested, in the township of Flawburn, county Durham, the scene of which have been bored to. They are known to be applicable to steam-boat, manufacturing, and coking purposes.—For particulars, plans, &c., apply to Mr. THOS. E. FORSTER, 7, Ellison-place, Newcastle; or to Mr. E. F. BOYD, Urpeth, Chester-le-street.—Oct. 8, 1857.

ENGINEERS' TOOLS TO BE SOLD.—A LARGE STOCK of NEW and SECOND-HAND SLIDE and SCREW-CUTTING LATHEs, from 34 in. centres, and from 4 to 34 ft. long; PLANING MACHINES, self-acting in the vertical, angular, and horizontal cuts, from 4 to 24 ft. long; SINGLE and DOUBLE GEARED DRILLING MACHINES; SHAPING MACHINES of the newest construction; also SCREWING, SLOTTING, SHEARING, and PUNCHING MACHINES, and all kinds of ENGINEERS' TOOLS, either in stock, or made to order.

Tradesmen of the above will be sent, and the tools may be seen, on application to Messrs. HENRY ASHFORTH and Sons, Exchange-square, Lincoln-street, Nottingham.

PUMPING AND WINDING ENGINES.—FOR SALE, an excellent 50 in. PUMPING ENGINE, 10 ft. stroke, two boilers 10 tons each, in perfect condition, nearly new, with fire-proof house. A 24 in. WHIM HORIZONTAL ENGINE, with 10 tons boiler, nearly new, in excellent condition, and drawing machine attached.

As these engines are very superior in make and condition, parties requiring engines will do well to examine them.—Apply to Mr. C. WESCOMBE, 21, Southgate-street, Exeter.

TO ENGINEERS, SHIP-BUILDERS, AND OTHERS INTERESTED IN SHEET-IRON STRUCTURES.

BERTRAM'S PATENT WELDING PROCESS.—This SIMPLE and EFFICIENT PROCESS for UNITING WROUGHT-IRON PLATES in the construction of Marine, Locomotive, and Land Boilers, Ships, Boats, Caissons, Tanks, Pans, Bridge Beams, Girders, and Sheet-Iron Structures generally, by WELDING instead of RIVETING, combines, with great ECONOMY of LABOUR and MATERIAL, the certainty of greatly INCREASED STRENGTH, PERMANENT SOUNDRNESS, and FREEDOM FROM LEAKAGE.

This invention having been most satisfactorily tested, the patentee is prepared to GRANT LICENSES for the USE of his PROCESS; and invites the inspection of a HIGH-PRESSURE TUBULAR BOILER, which has been constructed under his immediate direction, and may be seen at the works of the VICTORIA FOUNDRY COMPANY, engineers and ship-builders, Greenwich.

Applications for licenses, and particulars of works required, may be obtained at the office, 12, Buckingham-street, Adelphi, W.C., where samples of the welding may be seen. The welding furnaces will be supplied by the patentee's agent.

MARINE SMOKE PREVENTION. BY MR. LEE STEVENS. No charge for patent right unless successful. 1, FISH STREET HILL, CITY, LONDON, E.C.

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Mr. R. V. TUSON, F.C.S., F.S.A. (late Demonstrator of Chemistry at St. Bartholomew's Hospital), may be CONSULTED on all SUBJECTS involving CHEMICAL PRINCIPLES; and is prepared to EXECUTE all kinds of METALLURGICAL AGRICULTURAL, COMMERCIAL, and other ANALYSES.

Mr. Tuson has a vacancy for a pupil, resident or otherwise.

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On the 5th of each Month, for MELBOURNE,
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MARCO POLO 1625 3500 CLARKE 5th February.
OLIVER LANG 1209 3000 OSBORNE
OCEAN CHIEF 1092 2500 BROWN
LIGHTNING 2090 4000 BYRNE To follow.
SALMON 1563 3000 WATTS

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PORt, SHERRY, &c. TWENTY SHILLINGS PER DOZEN.

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Messrs. Knowles and Buxton can with confidence bring before the public their IMPROVEMENT in TUVERES, having proved their utility at Mr. Knowles' furnace, Brimington Moor, as well as at other furnaces in the surrounding neighbourhood. They are now perfectly satisfied that one trial will be sufficient to convince all practical furnace managers that they are the CHEAPEST and BEST ever offered to the public. The annexed diagram shows the principle to be both simple and efficient, conveying a current of cold water direct to the nozzle of the tuyere, which is made of thin tubing (without the incumbrance of cast-iron), allowing the cooling property of the water to act direct upon that part most exposed to the fire, and is sufficient to keep the liquid metal from adhering to the tuyere, which is not the case with those generally in use. After taking into consideration the first cost, and the advantage of being able to work them longer without the loss of time in replacing, or injuring the metal, they will be found, after a fair and impartial trial, to be most decided a great advantage to furnace proprietors.

Messrs. Knowles and Buxton are prepared to SUPPLY hot-blast furnace tuyeres, with sockets, at 3s. each; without sockets, at 3s. each; smiths' forge tuyeres, at 1s. each; delivered at Chesterfield Station.

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EXHIBITION 1851.

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SLIDE AND CENTRE LATHES, PLANING, SHAPING, BORING, DRILLING, SCREWING, WHEEL CUTTING, AND OTHER MACHINES.

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Shares.	Paid.	Last Price.	Present.	Dividends per share.	Last Paid.	Shares.	Paid.	Last Price.	Present.	
Mines.						Mines.				
3120 Alfred Consols (cop.), Phillack [S.E.] 32. 11s. 10d.	418	12 13	218 1 0	60 4 0	Dec. 7, 1857.	812 East Basset (copper), Redruth. 27 1/2	104	23 1/2	95	
1824 Ballewswidden (tin), St. Just.	114	4	12 13	12 3 0	Dec. 5 0	1024 East Basset (copper), Redruth. 13	2	23 2	3	
1824 Bedford United (copper), Tavistock. 31. 6s. 5d.	90	8 1/2	8 0 0	9 11 6	June 5 0	1024 East Caradon (copper). 2 1/2	12	—	—	
1824 Bonsai (tin), St. Just.	30 1/2	90	21 0 0	3 0 0	Aug. 27, 1857.	1024 East Cornwall Cons. (tin & ep.). 2 1/2	3	21 2	3	
1824 Boulhake (tin, copper), St. Just.	91 1/2	150	120 190	118 5 0	Sept. 4, 1857.	1024 East Fronroch. 16s. 6d.	—	—	—	
1824 Brightside and Froggatt Grove, Derbyshire. 3	4	3 1/2	3 0 0	3 0 0	Sept. 30, 1856.	1024 East Gomanas (copper). 1s. 3d.	4	—	—	
1824 Bryant Hall (lead), Flint. 20	40	40	13 0 0	9 0 0	July 31, 1856.	1024 East Hender (copper), Crown. 1s.	—	—	—	
1824 Bryntaf, Llanddow, Montgomeryshire. 73	2	1 1/2	0 5 0	0 5 0	Sept. 1, 1856.	1024 East Kett Hill (tin). 1s.	1	14 1/2	12	
1824 Budadick Consols (tin), Pwllan. 3	5	6	0 10 0	19 0 0	Mar. 25, 1857.	1024 East Providence (tin), Umy Lel. 1s.	1	14 1/2	12	
1824 Bwch (silver-lead), Cardiganshire. 31. 1s. 6d.	1	1	0 2 6	2 6 0	July 30, 1856.	1024 East Rosewarne (tin), Crown. 1s.	—	—	—	
1824 Carn Brea (copper, tin), Illogan. 15	45	45 20	237 10 0	10 0 0	Nov. 13, 1857.	1024 East Sortridge. 26	—	—	—	
1824 Carnforth (tin), St. Just.	4 1/2	5 1/2	5 1/2 64	8 15 0	June 20, 1856.	1024 East Trelusis (copper), Redruth. 47	85	45 43	—	
200 Coal Cwm Brynn (lead), Cardiganshire. 23	55	43	3 0 0	3 0 0	Oct. 4, 1857.	1024 East Welsh Ager. 67	5	51 6	—	
200 Coliscombs (copper). 5	16	14 1/2	2 5 0	2 5 0	Dec. 2, 1857.	1024 East Welsh Clifford (cop.), Kew. 2	1 1/2	—	—	
236 Conducrewe (copper, tin), Camborne [S.E.] 20	105	90 100	85 0 0	2 0 0	June 10, 1857.	1024 East Welsh George (cop.), Devon. 24 6.	2 2 1/2	—	—	
1655 Craddoed Moor (lead), St. Cleer. 8	49	37 1/2	0 12 0	0 7 0	Nov. 6, 1857.	1024 East Welsh Robert (copper). 1s.	3/4	3 3/4	3	
1824 Craven Moor, Limited (lead), Yorkshire. 1/2	—	—	0 9 0	0 9 0	Dec. 28, 1856.	1024 East Welsh Russell, Tavistock. 41 1.	8	23 3/4	3	
126 Cwmystwith (lead), Cardiganshire. 60	140	150	105 0 0	5 0 0	Dec. 16, 1857.	1024 East Welsh (lead). 6s. 6d.	—	—	—	
200 Derwent Mines (silver-lead), Durham. 300	150	122 0 0	10 0 0	—	1024 Fox for Allevyn (t.e.c.), Limit. 5	3	—	—		
1824 Devon Great Consols (cop.), Tavistock [S.E.] 1	420	423 127 1/2	595 0 0	8 0 0	Nov. 20, 1857.	1024 Fox Donald (lead). 6s. 6d.	—	—	—	
672 Ding Dong (tin), Guvra. 33 1/2	20	17 1/2	16 7 0	10 0 0	Mar. 2, 1857.	1024 Forest (copper), Illogan. 6	4	—	—	
170 Dolmorth (copper, tin), Camborne. 237 1/2	200	190 200	94 0 0	8 0 0	Oct. 12, 1857.	1024 Fox for Allevyn (t.e.c.), Limit. 5	3	—	—	
1824 Drake Walls (tin, copper), Calstock. 14. 10s.	1/2	1/2	0 12 0	0 12 0	Sept. 11, 1857.	1024 Fox Great (cop.), Illogan. 61 15 10.	8	7 8	—	
300 East Daren (lead), Cardiganshire. 32	100	100	36 0 0	3 0 0	Dec. 10, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
2024 East Falmonth (lead).	3	4	4 1/2	0 5 0	Oct. 12, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
122 East Pool (tin, copper), Pool, Illogan. 34 1/2	340	150 200	222 10 0	2 10 0	Oct. 23, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
5700 Exmouth (silver-lead). 41. 14s.	8	3 1/2	3 7 0	0 2 0	Dec. 23, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
1400 Eyan Mining Company (lead), Derbyshire. 5	60	58 1d	58 1d	58 1d	Dec. 26, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
4940 Fowey Consols (copper), Twardreath. 4	7	5	41 4 3	0 8 0	Feb. 17, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
4445 General Mining Co. for Ireland (cop., lead). 3 1/2	1	2	1 0 8	0 2 0	June 5, 1852.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
3000 Goginan (silver-lead), Cardiganshire. 11 1/2	—	—	2 1/2	0 2 0	Sept. 5, 1856.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
1024 Gomana (copper), St. Cleer. 12 1/2	15	10 12	0 7 8	0 7 8	Dec. 21, 1852.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
2424 Grabley and St. Aubyn (copper). 100 1/2	82 1/2	82 1/2 85	6 0 0	2 0 0	Nov. 9, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
8000 Great South Tolmar [S.E.] 2 1/2	15 1/2	15 1/2 15	1 9 6	0 5 0	Dec. 17, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
8000 Great Wheel Vix (tin, cop.), Holston [S.E.] 1/2	1	1/2	0 5 0	0 5 0	Sept. 27, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
119 Great Work (tin), Gormoe. 100	140	22 1/2	22 1/2 10 0	7 10 0	Sept. 27, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
1024 Herdstock (lead), near Liskeard. 8 1/2	—	—	2 1/2	0 2 0	Oct. 12, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
6000 Hington Down Consols (copper), Calstock. 3 1/2	7	7	0 5 0	0 5 0	Oct. 25, 1856.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
2000 Holiford (copper), near Tipperary. 11	—	—	2 1/2	0 2 0	Oct. 25, 1856.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
2460 Isle of Man (Limited). 25	43	42	55 17 8	1 0 0	Dec. 16, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
75 Jamie (lead), Mold, Flintshire. 31. 13s. 6d.	—	—	380 0 0	5 0 0	Apr. 10, 1851.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
30 Laxey Mining Company, Isle of Man. 100	1000	1000	1000	1000	—	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
100 Levant (copper, tin), St. Just.	3 1/2	30	90	90 90	—	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
5000 Lewis Mines (tin, copper), St. Erth. 6. 1s. 11s. 6d.	—	—	102 0 0	4 0 0	July 12, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
4000 Llebarne (lead), Cardiganshire, Wales. 18 1/2	120	120	304 10 0	3 0 0	Dec. 5, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
6000 Marks Valley (copper), Calstock. 41. 10s. 6d.	—	—	2 1/2	0 5 0	Dec. 10, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
2000 Mendip Hills (lead), Somerset. 3 1/2	—	—	1 7 5	0 5 0	Dec. 29, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
2000 Merlin (lead), Flintshire. 25	—	—	1 11 0	0 10 0	Jan. 22, 1853.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
2000 Miners Mines (Limited)	25	30	90	125	24 2 6	10 2 0	Nov. 11, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—
5000 Nanticoe and Penrhys, Limited (21 1/2 shares)	1/2	1/2	12 15	12 15	0 10 0	0 10 0	July 27, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—
2460 Nether Hearn, Westmorland. 2x.	—	—	15	15	12 15 5	12 15 5	0 10 0	0 10 0	July 27, 1857.	
470 Newtonards Mining Company, Co. Down. 50	—	—	1 1/2	1 1/2	24 10 0	20 0 0	Nov. 18, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—
2000 North Pool (copper, tin), Pool. 361. 10s. 3d.	70	60 70	324 0 0	2 0 0	Dec. 23, 1854.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
2000 North Roseau (copper), Camborne. 10	25	25	25 25	25 25	750 0 0	4 0 0	Sept. 5, 1852.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—
2000 North Wheel Basset (cop., tin), Illogan [S.E.] 1/2	12 1/2	12 1/2 12	13 19 0	0 6 0	Oct. 4, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
2000 Par Consols (copper), St. Blasie [S.E.] 7	15	15	31 4 6	1 10 0	Oct. 2, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
2000 Peak United (lead), North Derbyshire. 7 1/2	2 1/2	2 1/2	4 10 0	0 10 0	Apr. 1, 1856.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
2000 Phoenix (copper, tin), Linkinhorne. 100	370	370	244 10 0	20 0	Nov. 18, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
2000 Polberr (tin), St. Agnes (Preferential). 15	—	—	18 11 9	1 0 1	Dec. 3, 1857.	1024 Fox Wh. Eliot (cop.), Camborne. 1s. 10.	—	—	—	
1722 Price (Old). 1/2	—	—	0 10 0	0 10 0	Dec. 1, 1857.					